



FRIDAY, JULY 8.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Elections.—Knoxville & Midland, T. C. Leake, President.—Lincoln & Black Hills, G. W. Holdredge, President.—Palatka, Welaka & Lake, Sherman Conant, President.—Poughkeepsie & Delaware Valley, H. R. Low, President.—Wabash Western, Charles M. Hays, General Manager.

New Companies Organized.—Chicago & State Line files articles of incorporation in Illinois.—Chicago, Kansas & Southwestern is incorporated in Kansas.—Indiana & Lake Michigan is incorporated in Indiana.—Knoxville & Midland is organized in Tennessee as an auxiliary to the Tennessee Midland.—Lincoln & Black Hills files articles in Nebraska.—Little Rock & State Line files articles in Arkansas.—Mohawk & Susquehanna files articles in New York.—New York, Mahoning & Western files articles in Ohio.—Palatka, Welaka & Lake files charter in Florida.—Riverside & Arlington Electric is incorporated in California.—Tillamook Railway & Navigation Co. is organized in Oregon.

Changes and Extensions.—Arkansas: Memphis & Little Rock will be extended to Dallas, Tex. Arkansas Midland will widen gauge this week.—California: The Northern California will be extended 25 miles.—Illinois: Wisconsin Central reported to be preparing to build from Antioch to Lake Geneva, Wis. Minnesota & Northwestern has a line completed from Freeport to within 9 miles of Chicago. Springfield & Southern Illinois begins survey. Centralia & St. Genevieve institutes survey.—Minnesota: Duluth, Huron & Denver begins grading from Sauk Centre.—New York: Massena Springs & Fort Covington begins tracklaying. Chateaugay road is to be extended.—North Carolina: Marietta & North Georgia will be extended from Murphy, Ga., to Knoxville, Tenn.—Nebraska: St. Joseph & Grand Island has been completed to Stromburg, Nev.—Texas: St. Louis, Arkansas & Texas has Sherman branch completed to within a few miles of Sherman.

Traffic.—Anthracite coal shipments for week ending July 2 show increase of 40.3 per cent., as compared with corresponding period last year; bituminous shipments show decrease of 9 per cent.; coke, for week ending June 25, shows decrease of 64 per cent. Cotton receipts, interior markets, for week ending July 1, show a decrease of 67.6 per cent., as compared with corresponding period last year; shipments show decrease of 66.1 per cent.; seaboard receipts, a decrease of 73.4 per cent.; exports, a decrease of 64.2 per cent.; cotton in sight is less than at same date last year by 28.5 per cent.

Contributions.

Furnace Slag as a Material for Ballast—How Much is it Worth?—How can a Supply be Best Obtained.

OHIO, July 2, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. W. B. Parsons, Jr., C. E., in his "Track," says: "Furnace slag answers the purpose of ballast nearly as well as stone. It is extensively used in England, where it is drawn from the furnace on an endless belt, and then suddenly cooled by application of cold water; this hardens and breaks it at the same time."

It would interest a number of the readers of the *Gazette* if they could learn more about the method of delivery from the furnace as above mentioned, with the cost of the slag per cubic yard in cars. Some who have a measure of experience with slag as ballast are not agreed as to its value for this purpose. As compared with good gravel it is expensive. A raise in track of from 10 to 12 inches with slag broken by hand will cost not far from \$1,500 per mile, with labor at \$1.10 and a haul of 10 to 20 miles for the material. An undue proportion of this expense is for breaking. The slag does not run uniform, one car-load will perhaps take six times as long to break as another just preceding or following it.

The reason for this is owing to the manner of cooling the slag. The ordinary method is to draw it from the furnace on to a yard which has been previously wet down with a hose to make it endurable for the men who "snap" it. The hot slag, as it runs down over the wet yard turns the water into steam, which expands and distributes itself through the mass, making of three-fourths of the whole bulk a very light honey-combed material that it is very difficult to break with the ordinary ballast hammer. Other parts of the slag will be solid, resembling limestone, and readily breaking in any direction at the first light blow. A small part again will be fine powder resembling cement, in that when mixed with water and clay, or sand, it hardens to the consistency of rock. When sufficiently cooled and "snapped" men shovel the whole product up together and load it into cars at a cost of from \$1 to \$2.50 per car-load, varying according to the convenience of the loading arrangements and the length of haul in cars. Has any one used a crusher at the furnace yard for breaking slag, and can they give the comparative cost of breaking in this way? For many furnaces the cost of removing the slag is quite an item of the daily running expenses.

Why cannot the method so generally in use in England be introduced here with advantage to the furnaces, and also to

the railway companies, among whom the use of slag as a ballasting material is increasing?

C. C. C.

Annual Convention of the American Society of Civil Engineers.

The annual convention of the American Society of Civil Engineers, which closed last night, began with the departure of a large party from New York last Friday by the Albany day boat. They took the Ulster & Delaware, Stony Clove & Catskill Mountain, and Kaaterskill railroads to the Hotel Kaaterskill, where the convention was held. The programme was arranged for technical discussions on Saturday; the annual address of the President, Mr. William E. Worthen, Saturday evening; papers and discussions Monday, fireworks and a ball in the evening; an excursion to Poughkeepsie Tuesday to visit the bridge work; sessions of the convention and business meeting Wednesday; an excursion to the cement works and quarries at Binnewater, on the invitation of Mr. F. O. Norton, Thursday, and a banquet at the hotel in the evening. This programme was carried out with little variation.

The arrangements of the Committee on Convention, Messrs. William G. Hamilton, John Bogart and Stevenson Towle, were very complete, and the transportation and care of the party were managed with perfect smoothness and the greatest comfort to all. Shortly after arriving at the hotel the members and guests of the society were welcomed by the committee, and the flag of the society was hoisted with proper ceremony. The proper ceremony included a song written for the occasion and the circulation of the "loving cup."

SATURDAY.

Saturday's proceedings began with the discussion on the subject of Inspection and Maintenance of Railroad Structures.

The secretary of the society had sent out a circular asking from the member receiving it replies to the following questions:

1. What measures, legal or other, can be taken to insure a proper inspection of railway bridges?
2. What is proper bridge inspection?
3. Should there not be a standard specified rolling load much heavier than as now generally used, and a specified engine wheel base for rolling loads?
4. Is it not expedient to adopt a standard bridge floor?
5. Should not bridges of small span be made strong enough for a buckle plate floor, and a continuous coat of ballast on the bridge, and if so, up to what span should this apply?
6. Should not a safety guard (Latimer) be used at all openings over a certain width?
7. Should there not be required either overhead crossings, or, in their place, interlocking apparatus with derailing switches?
8. Is legislation as to any of these points, or as to any others you may suggest, expedient, and, if so, what sort of legislation?

9. In this connection the experience of the Master Car-Builders' Association has been referred to, which, it is stated, has proved that the action of large committees reporting to the society, and the adoption of standards after ample discussion, have been found very valuable.

In reply to this circular several communications were received and some abstract of them is here given.

Mr. John A. Wilson, of Philadelphia, says regarding question No. 2, that by proper bridge inspection he understands such examination and oversight as will insure the immediate detection of any defect, or signs of failure, or disarrangement of any of the parts of the structure so that the condition may be positively known at all times. The first step is to have in the office of the bridge engineer full detailed plans of all structures, with strain sheets. The bridge engineer should make personally a critical examination of each structure at least once a year, and keep a record of his examinations and of the reports of his subordinates. A competent master carpenter or foreman of bridges should examine every bridge once a month and report in detail to the engineer. A road watchman should make a daily examination. In the engineer's examinations he should be accompanied by these men, and confer with them freely. By this system any defect should be detected at once. But the inspection should begin with the bridge to be constructed and follow it through to the road. The maintenance of bridges is a different business from the designing of them, and can only be learned by practical experience, and hence the necessity for an Engineer of Maintenance of Bridges.

Question 3. It would be difficult to establish an absolute standard of rolling load for all railroads. Each should establish its own standard, high enough to cover all contingencies of its traffic.

Question 4. It would be well to decide on the best design of bridge floor and have it brought into general use.

Question 5. Mr. Wilson was not prepared to answer this question, but saw practical objections to the general adoption of the plan.

Question 6. It is very desirable to use a safety guard where practicable.

Question 7. Grade crossings became very numerous in this country from the early necessities for economy. Now there is a very decided aversion on the part of railroad managers to the extension or repetition of the evil. The danger to life and property at grade crossings can be partly eliminated by interlocking signals, but there will remain a percentage of danger from carelessness of employees, breakage of machinery or errors of judgment on the part of engineers as to the power to stop trains on slippery rails, etc. There must be more or less delay of traffic at grade crossings, and there is the ex-

pense due to cost of plant and maintenance at crossings, and the further expense due to stops as well as to injuries to life and property and to rolling stock. Hence a separation of grades should be had whenever practicable; and when it is impracticable there should be every known safeguard, such as interlocking signals and derailing switches.

Questions 1 and 8. For many reasons it is desirable to follow the general policy of leaving the railroads free to make their own regulations, holding them pecuniarily responsible for the results. If, however, legislative control is thought necessary it should be established only after full discussion and consultation with the leading engineers and railroad men of the country. If a few of the leading railroad companies would introduce a thorough and effective system of bridge inspection, separating the professional oversight of bridge work from its mechanical execution, its advantages would soon be recognized and public opinion would force its general adoption. The subject of grade crossings, however, is one that perhaps more properly could and should be regulated by law. The state laws now existing on the subject are generally crude, indefinite and subject to local contingencies for their operation.

A communication was read from Mr. Willard S. Pope, President and Engineer of the Detroit Bridge and Iron Works. Mr. Pope thinks that while an enlightened self-interest ought to be and often is an efficient safeguard, still, in too many instances, the persons in authority do not know or are not competent to judge of the condition of a bridge, and in other cases they from motives of false economy are led to trust it too far. The matter is a reasonably clear one for the intervention of the higher power of the state. But to act efficiently the state must act intelligently, and to judge of the safety of a bridge must in the nature of things be the work of a trained expert. Therefore, it is apparent that any control over bridges, which the state may assume, will be vain and useless, unless the matter is placed in the right hands. To a commission organized by the state the whole business should be relegated, and all bridges within the limits of the state, whether railroad or highway, should be placed under its jurisdiction. A critical examination of every bridge should be had annually, and a report made to the authorities in charge thereof. If found unsafe, it should be closed to traffic unless the recommendations of the commission are immediately complied with, and the company or town owning it should be held responsible in penal damages for any accident occurring thereafter. The commission should publish general specifications, and no bridge should be built except in conformity to those specifications. All plans for new bridges should be submitted to the commission and receive its written approval before work is commenced, and all work in progress should be subject to its inspection. No new bridge should be opened for public use till examined and approved. Plans of all bridges should be filed at the office of the commission and open for the inspection of the public. But it must be distinctly understood that the rights and responsibilities of the owners of bridges, whether companies or towns, are not to be curtailed. They must maintain and inspect their property, and the commission simply see that it is safe.

The commission should be headed by a bridge engineer of integrity, tact, skill and discretion. He should have absolute control over his assistants, their pay and appointment, and he must be in every respect a first-class man. He should receive a salary of at least \$10,000 a year, and his term of office should be five years, subject to dismissal by the governor for cause. The yearly cost of such a commission for the state of Michigan would probably be \$40,000, one-half to be paid by the state and one-half by the railroad companies, proportionately to their track mileage. The railroads could well afford to pay for the active and capable corps of consulting engineers thus established, particularly where the increase of public confidence is considered. As to the authority which would appoint the commissioner, Mr. Pope reasons that it should be absolutely divorced from politics, but should be made by those most directly interested, and as the town and county officials could hardly act together in the matter, from their wide separation and for other causes, the choice of the commissioner would ultimately fall to the railroads, who would nominate and the governor appoint him.

Mr. Edw. S. Philbrick, of Boston, thought that an enlightened public opinion, and the publicity of facts were the best incentive to safe administration and operation of railroads.

Question 1. Railroads should be required by law to file in the offices of state Boards of Commissioners plans and specifications in detail of all bridges, and the commissioners should be authorized to employ experts to examine and report upon those plans. An annual inspection and report should be made of every bridge by an expert in the employ of the company.

Question 2. Proper bridge inspection would include an examination of the strain sheet and of every member, comparing it with the strain sheet; also a search for signs of depreciation or wear, excessive deflection, inefficient lateral bracing, loose bolts, rust, etc., also for change of form in any combination or member.

Question 3. While it is proper to anticipate the probable future increase of rolling loads by the use of heavier standards it may not be proper to fix common standards to be used indiscriminately.

Question 4. Standard bridge floors should be adopted.

Question 5. Buckle plates and ballast have the serious defect of concealing rust and are therefore not to be recommended.

Question 6. Some safety guard should be applied at all openings in road bed over 10 feet in length.

Question 7. Level crossings should not be allowed unless protected by interlocking apparatus and derailing switches or their equivalent.

Question 8. Legislation is expedient if it relieves the company from no responsibility, but a state Board of Commissioners is preferable, whose duty should be to see that all reasonable safeguards are taken and to secure publicity.

From Mr. Albert Lucius, of New York: Question 3. Specifications of stresses to be borne and of rolling load must be considered together. If the various members are proportioned by the stresses prescribed in the "Erie specifications" they are sufficient if preceded by a consolidation engine, that preceded by a 48-ton engine on a wheel base of 12 feet. This would insure heavy bridges for small openings and heavy floors and details for long spans without increasing the chord members unnecessarily.

Question 5. Would prefer a floor of closely laid iron ties on iron stringers. Buckle plates and ballast would promote corrosion and prevent inspection.

Question 6. He recommends the use of Latimer guards in all cases. End posts of through bridges might be further protected by posts planted in front of them.

Questions 1 and 8. Hold the railroad companies strictly accountable for accidents.

Question 9. The result of the deliberations of a large committee would be beneficial, but the standards prescribed should be of a general nature, and not such as to cramp individuality.

From Mr. Andrew Bryson, of New York: Question 1. Railroad companies should be compelled by legislation to have competent inspection of all bridges at least once a year, and to furnish strain sheets and detailed drawings to the Railroad Commissioners. A minute form of report should be prescribed.

Question 2. Under proper inspection the strain sheet must be verified and the proportioning of the parts determined and an actual detailed examination made of the whole structure. On roads running frequent and heavy trains one or more members subjected to sudden shocks should be taken out and tested to destruction every year. Truss members should be taken out and tested at longer intervals—from 5 to 12 years, according to the amount of traffic.

Question 3. Several standards should be prescribed for the needs of different roads.

Question 4. Prescribing the width and strength of bridge floors the details might be left to the individual designers. Guard timbers should be prescribed, and in addition, an iron guard railing, high enough to bear against the side of a car in case of derailment.

Question 5. Recommend buckle plate floors and ballast for short spans.

Questions 6 and 7. Yes, emphatically.

Question 8. Legislation seems desirable, but it is a technical question. It would probably be well for the society to adopt a series of suggestions for legislation.

From Mr. E. P. Dawley, Engineer of the New York, Providence & Boston:

Question 1. He recommends the compulsory filing with proper state authorities of strain sheets of all bridges, and that authority be given to commissioners to cause bridges to be strengthened; but he would have legislation only general, leaving entire responsibility with the railroad.

Question 4. Proper bridge inspection of structures originally first-class and still ample for their loads would be covered by a thorough and minute inspection of every part and piece of the bridge once in four months. Measurements of deflections *might* be made also. A more general inspection should be made once a month.

Question 3. A rolling load of 3,000 pounds per lineal foot is not heavy enough for spans of 100 ft. and less; 5,000 pounds would probably be sufficient, with strains allowed about as in the "Erie Specifications."

Question 4. No great benefit in having all bridge floors of some fixed standard. A good floor is hard pine timber 8 in. x 9 in. x 26 ft. supported below in case of through bridge by stringers; timbers laid flatwise, 15 in. centre to centre; a guard timber 8 in. x 9 in. outside of each track and one between them. Guard rails running to a point in centre of each track, continued across the bridge, 7 in. from the main rail, and floor timbers to be carried out on to the ground.

Question 5. Does not approve of buckle plates.

Question 7. Either overhead crossings or interlocking apparatus should be enforced by law.

Question 8. Legislation enforcing standards of strength and methods of inspection as provided by the Society would be well for all parties.

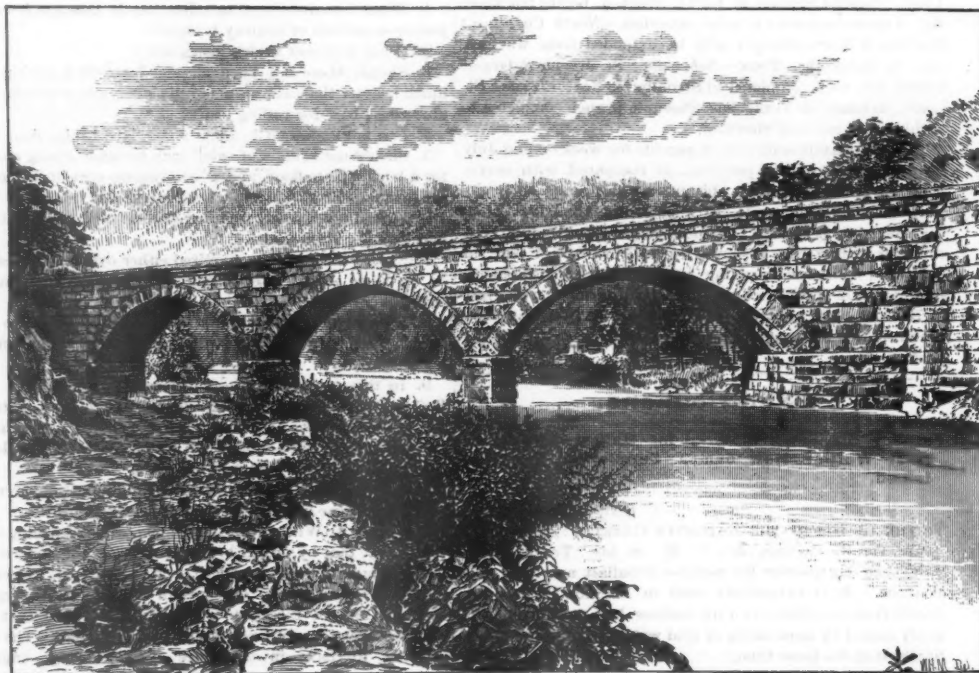
Mr. C. A. Marshall, of Johnstown, Pa., proposes a national commission to be appointed annually to examine inspectors and issue licenses. The licensed inspectors should be of three classes, for material, fabrication and design. None of the inspectors should be in the employ of any parties interested in the results of the inspection. There should be fixed maximum fees for inspection, and no inspector may refuse to take work at the regular fee plus mileage. After a certain time it should be made a penal offense to build certain structures without the services of a licensed inspector. A salaried chief inspector should have power to suspend. Companies should be compelled by law to furnish necessary drawings and information to the inspectors. This national legislation must be supplemented by the states for examination and reeding out of weak existing structures.

Questions 4, 5 and 6—Both inside and outside guards could be required by law and the opening between ties specified.

From Mr. J. M. Goodwin, of Sharpsville, Pa.: If the several societies of civil engineers of America will by a congress of delegates formulate a scheme for inspection of bridge



Mount Joy Arches, Philadelphia Division.



Birmingham Arches Across the Juniata.
MASONRY ARCHES ON THE PENNSYLVANIA RAILROAD.

and if the profession will discountenance the employment as inspectors of any but engineers of ability and standing, proper inspection will promptly follow; but those inspections should be made by judiciously selected agents of the public.

Question 4. Every bridge should have such a floor that a locomotive could smoothly travel on from end to end of the bridge. It may be quite narrow, but should have stout guards extending some distance beyond the bridge and flaring at the ends. With such arrangements buckle plates and ballast will not be necessary.

Question 6. The Latimer replacer should be set in each approach to every bridge.

Question 7. If there are crossings at grade there should be the means provided for positively preventing crossing collisions. The interlocking apparatus with diverting switches should be universal.

Question 8. The instances in which special legislation has done harm are very much more numerous than those in which it has done good, and the common law must always be superior to it. There seems no necessity for special legislation for the purposes under consideration.

Question 9. The society would do well to prepare a set of resolutions, expressing the sense of the society on bridge inspections, these to be submitted to the members for criticism and modification, and, if adopted, to be sent to sister societies for their action.

From Mr. Joseph M. Wilson, of Philadelphia:

Mr. Wilson dwelt on the difficulty of fixing a standard for bridge floors in the present state of practice, as the weight of rolling stock is increasing steadily, but he thought it would be a great point if there were a standard established by law for the designing of all iron bridges.



Christiana Arch, Philadelphia Division, Pennsylvania Railroad.

It would be well to classify roads, in regard to inspection of bridges, somewhat according to their traffic, and operating companies be prevented by penalty from putting a heavier class of business upon a line than that for which it is registered. He is in favor of a considerably heavier live load than that generally used. Mr. Wilson believes he was the first to use typical designs, representing engines of the future, for loading, and he found that it took but about 8 years to reach with actual practice the advance limits, which, at the time they were adopted, were supposed to be sufficient for many years to come, and he thinks he is justified in saying that the limit for live load should be made much higher than

it generally is. He would be in favor of adopting that recently authorized by the Pennsylvania Railroad.

He doubts the expediency of increasing the dead load on short spans by solid floors and ballast, but would rather reduce the allowable stresses per square inch. The adoption of standard bridge floors he does not think practicable, owing to the difference of condition and opinion. He would not put guards inside the rails but much prefers them outside.

For the organization of inspection of bridges he would have a complete tabulated list of all bridges kept on file in the proper office of the company, giving complete record of each structure with detail drawings and complete calculations. He would have on each bridge division, say of 150 miles, an assistant engineer in special charge of the bridges, with a good practical master carpenter or superintendent of bridges under him who should be familiar with methods of erecting and repair. The assistant engineer and the superintendent of bridges would make detailed inspections as often as necessary, and these should be supplemented by daily examination of the road foremen. On these men will rest the responsibility of the constant serviceable condition of the bridges. Examinations by experts should be made say once a year or once in two years, and copies of their reports filed with the assistant engineer in charge. This annual inspection, however, will in no way relieve from responsibility the local engineer. If this system is regularly and thoroughly carried out the traveling public will be sufficiently protected.

The reading of the foregoing communications was followed by an important verbal discussion, a summary of which will be given when the stenographic notes are available.

Saturday afternoon a brief paper was read by a German engineer, on Sewage Disposal. The reading of papers on the compressive strength of steel and iron bridge members was postponed. A paper by Mr. C. H. Haswell on Experiments with a Triple Thermic Motor was read; also one by Mr. Wagner, Superintendent of Shops at the Phoenix Bridge Works, on Shop Inspection.

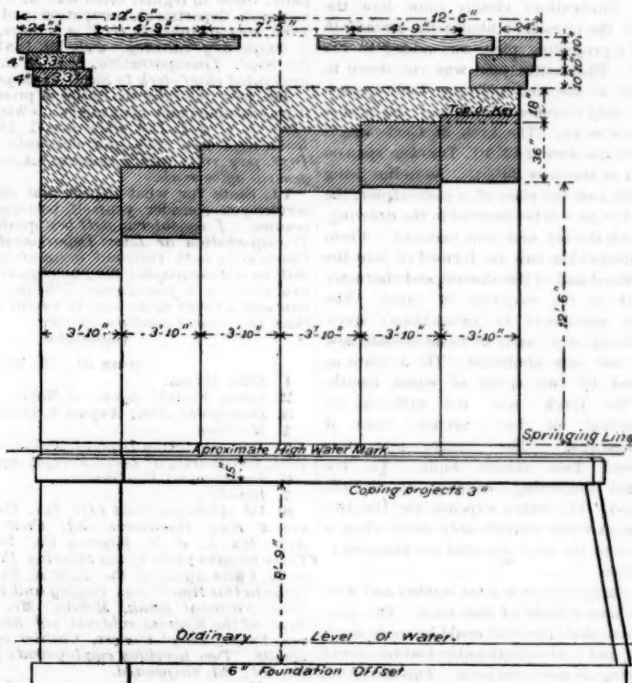
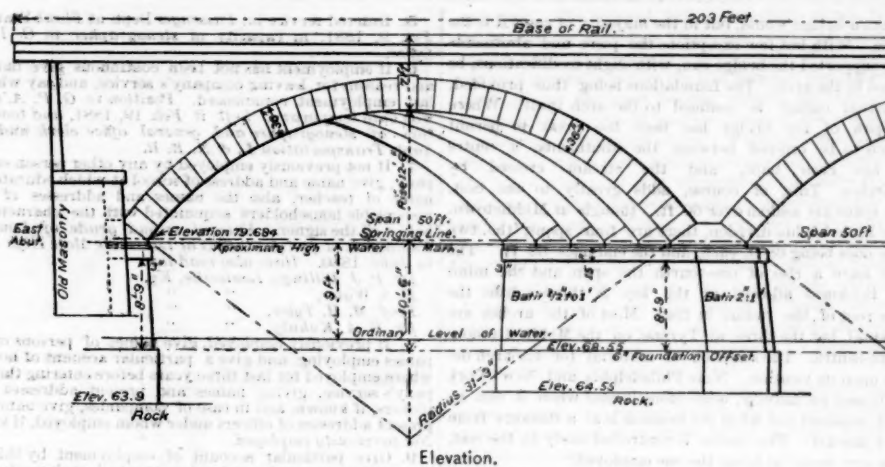
The statement made in the paper that steel bars were found preferable to steel tapes for accurate shop measurements called out some interesting facts from Prof. J. B. Johnson, of Washington University. As to the objection that steel tapes change in length rapidly from changes of temperature, it was replied that they would quickly assume the temperature of the piece on which they were laid, and there should be no difficulty from inaccurate or coarse graduation. There are now in St. Louis two 300-ft. tapes whose lengths have been obtained to a probable error of one one-millionth part, and base lines of three miles have been measured with them with an accuracy as great as by any base line apparatus yet invented. The coefficients of expansion of these tapes were carefully determined, one by continuous observations for four days and three nights. In observations and in use they were suspended by slings at various points and friction was entirely eliminated. A tension of 15 or 16 pounds was applied and readings made with reading microscopes. The delicacy of adjustment was such that the stretch due to the weight of a nickel five cent piece was observed. Considering the accuracy with which steel tape measurements can be made, and the convenience of their use, they should [not be hastily rejected. While the St. Louis experiments were going on experiments were also made in Norway with almost identical results as to accuracy. Saturday evening the President, Mr. W. E. Worthen, delivered the annual address, which was, according to the custom, a summary of the year's progress. The evening closed with an impromptu hop.

MONDAY.

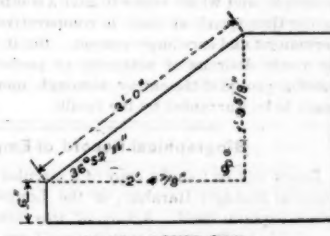
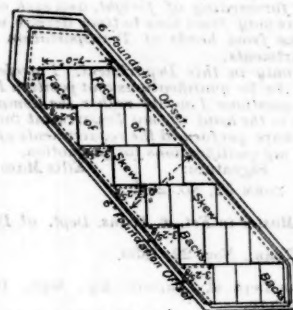
Mr. F. Collingwood presented a progress report of the Committee on Compression of Cement Mortar, which led to a discussion on the effect of frost on cement, the members present holding that during the time cement is frozen it does not set, but the setting proceeds satisfactorily after it thaws. Mr. Church called attention to the fact that we so far had but about 15 years experience with Portland cement, while the experience with the natural or Rosendale cements was much greater, and said that, though at the end of a year or so Portland cement showed a higher tensile strength than Rosendale, yet in masonry of some age the Rosendale seemed to have the stronger adhesion to the stone. Mr. North cited the advantage Mr. Chesbrough derived from mixing two different cements, one of them a decidedly poor one, the mixture being much stronger than either one alone. Mr. W. C. Wetherill read a brief paper relating some experience with frozen cement.

Mr. O'Rourke then read a paper on the Poughkeepsie Bridge, illustrated with diagrams, describing with details the foundations and false works, the method adopted for repairing the top of pier No. 2, put down 10 years ago, with the anchorage of the new cribs and the difficulty they met in holding the first one put down by the Union Bridge Co. during a freshet, and the final success. After some discussion on the methods employed at Poughkeepsie, and in other rivers, for holding large cribs in place in strong currents, it was suggested that it was 4th of July, and the meeting adjourned.

After dinner, a discussion arose among some of the members of the society about the necessity of a larger meeting room for the society, and President Worthen suggested that a one story addition should be built on the back of the lot, which would give a room about 55 ft. x 23 ft., lighted from the top, the present high stoop taken down and an entrance made on the street level, and some other improvements made, all of which would cost about \$4,000. The plan met the approval of most of those present, and an informal meeting was at once organized, the necessary resolution passed, a subscription paper drawn up, and, under the stimulus of a



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Section of SKEW-BACK.

Details of Birmingham Arches.

MASONRY ARCHES ON THE PENNSYLVANIA RAILROAD.

\$1,000 subscription from Wm. G. Hamilton, and \$500 each from Wm. E. Worth and D. J. Whitmore, nearly \$5,000 was raised in about ten minutes.

TUESDAY.

Nearly all the members accepted the invitation of the Union Bridge Co. to visit the Poughkeepsie Bridge, and started from the hotel, in a mountain mist, about 8.30.

Masonry Arches Replacing Iron Bridges—Pennsylvania Railroad.

For some time past the Engineering Department of the Pennsylvania Railroad has been engaged in substituting masonry arches for its short span iron bridges. This work has been confined to no particular branch of the Pennsylvania system, but has been pushed at those points where the condition of the bridges seemed to demand the most immediate attention. The reasons leading to the adoption of such a course by one of the most prominent roads in the country may be studied with evident advantage.

The history of the bridges of short span on the Pennsylvania may be divided into three general stages, indicating improvements in the designs. First came the wooden Howe truss bridges, the spans of which averaged about 100 ft., and were seldom as long as 150 ft. Then came the Pratt truss with low connection and chord pieces in one length; this was of cast and wrought iron. Following this was a modified form of Linville truss, also of cast and wrought iron. As our readers are familiar with these types a detailed description is unnecessary.

The experience of the Pennsylvania with these bridges is similar to that of every other road. They have always been a source of anxiety, have required a continual exercise of the greatest care, and their inspection, repairing, reinforcement and final renewal at comparatively short intervals of time have served to incessantly drain the finances. It early became apparent that it was impossible to so proportion them that they would safely bear the load to which they might be subjected a few years after their erection without providing them with an extra quantity of material which would be practically useless during the first and perhaps the greater portion of their existence. This feature of the problem remains unchanged even now, and the load which a bridge may be called upon to bear five or ten years hence cannot be foretold. There is no method of ascertaining whether the locomotive has reached its maximum weight or whether it will continue to increase.

The masonry arch possesses none of these disadvantages, and although in first cost it exceeds the iron bridge, it demands no continual outlay of any importance. The cost of inspection is merely nominal, no reinforcement will be required since, in all probability, it will always have a surplus strength, and no renewal will become necessary as the materials entering into its construction suffer no deterioration and are not subjected to wear. Further than this, it is safe from injury caused by accidents and may be said, in a certain sense, to prevent accidents.

These considerations led the Pennsylvania to adopt the course it is now pursuing. In some instances the arch costs

less than a bridge would, but in the majority of cases it is the reverse. With but few exceptions the piers and abutments which supported the bridge can, with slight modifications, be adapted to the arch. The foundations being thus provided, the actual outlay is confined to the arch itself. Where the span of the bridge has been too great to permit an arch to be erected between the abutments, a centre pier has been built, and the stream crossed by two arches. This, of course, adds greatly to the cost.

The spans are seldom over 60 ft., though at Middletown, on the Philadelphia division, there are four spans, the two centre ones being 68 ft. each, and the end ones 62 ft. The arches have a rise of one-fourth the span, and the minimum thickness allowed at the key is three-eighths the square root of the radius in feet. Most of the arches are segmental, but the three at Tyrone, on the Middle division, are five-centre. The selection of material for the arch depends upon its location. Near Philadelphia and New York brick is used exclusively, while stone is used when it can be readily obtained and when the location is at a distance from a brick market. The choice is controlled solely by the cost, the cheaper material being the one employed.

The accompanying illustrations clearly show how the arches are adapted to the piers and abutments already in place. At Mount Joy a projecting pier was added to the face of each abutment. The centre pier was cut down to the springing line of the arches, and additions built to each face. These were the only changes needed, and the arches were erected on the new work. The arch at Christiana is remarkable, as it is built on a skew of 42° 10'. The clear span on the square is 15 ft. and on the skew 28½ ft., the radius being 13 ft. 2½ in. This arch took the place of a plate girder, the abutments being added to, as will be observed in the drawing, which plainly shows both the old and new masonry. From these two cases an accurate idea can be formed of how the old foundations are utilized and of the amount and character of new work required in the majority of cases. The view at Birmingham represents an exceptional specimen in which the conditions were such as to necessitate new piers and practically one new abutment. The Juniata at this point was crossed by two spans of equal length. The elevation of the track was not sufficient to permit the introduction of two arches, even if that had been desirable. The centre pier was therefore removed and two others built. To the abutments were added projecting courses, as in the two cases just mentioned. The extra expense for the two new piers made these arches cost considerably more than a bridge would. We present the most essential working drawings of one of these arches.

This policy of the Pennsylvania is a far-sighted and wise one, and is peculiarly characteristic of that road. The company recognized the fact that the road could be made more perfect and permanent, and that objectionable features could be overcome, by following an unbeaten path. This deviation has caused an unusual outlay at the start, but it will result in checking a considerable and uninterrupted drain, and it is safe to assume that in a short time the additional expense incurred will have been more than compensated for. This question will not influence those roads which are governed by the penny wise principle, and which prefer to have a continual repair account rather than spend at once a comparatively large sum for a permanent and sure improvement. But it will be appreciated by roads desirous of attaining as perfect a condition as possible provided the outlay, although more than usual, appears to be warranted by the results.

Biographical Record of Employees.

Below will be found a copy of a circular recently issued by General Manager Harahan, of the Louisville & Nashville, which explains itself. Action of this kind is highly commendable for the reason that it gives form and definiteness to thoughts that engage more or less of the attention of all managers, but which for various reasons are allowed to remain vague and valueless. A good example like this is likely to be followed by many. Following the circular will be found some examples of the reports required by it. The salaries and some unimportant matters are omitted, and the names are lacking in the element of reality.

"It has been found desirable that there should be in the general office at Louisville a record showing the history and experience of each agent and clerk on the system. These employees are considered in the line of promotion; and, to assist the management in intelligently placing men in the positions for which their experience best qualifies them, Form 51 has been prepared, which will be forwarded to each employee of the classes named, to be by him filled and forwarded to the General Manager's Assistant at Louisville. Employees in other departments, desiring promotion in the Transportation Department, will, upon application, be supplied with a blank Form 51, which they may fill up and forward as above. Care should be taken to fill the form correctly, as each employee's method of giving the information called for will be accepted largely as a criterion of his intelligence and capacity. They should, of course, be filled in the personal handwriting of the employees signing them.

Each Superintendent will prepare and forward to this office a list of his agents and clerks; and also of those engaged in other departments on his division, whom he considers eligible for appointment in those capacities. And he will report monthly a list of the new men employed as agents or clerks, and also those transferred to or from offices on his division."

[The italics show the portions written in by the employee.]

Form 51, No. 218.

LOUISVILLE & NASHVILLE RAILROAD.

1. Name in full, Chas. A. Johnson.
2. Present occupation, Chief Clerk in Supt.'s office at Blank Station.
3. Born at Louisville, Ky., June 29, 1861.
4. Married or single, Single.

5. Entered service in, Passenger Dept. at Blank Station on Feb. 9, 1881, in capacity of stenographer in G. P. A.'s Office.

6. If employment has not been continuous give dates of, and reasons for, leaving company's service, and say when the last employment commenced. Position in G. P. A.'s office was only temporary. Left it Feb. 19, 1881, and took position of stenographer and general office clerk under the Supt. Transportation L. & N. R. R.

7. If not previously employed by any other person or company, give name and address of school at which educated and name of teacher, also the names and addresses of three responsible householders acquainted with the character and habits of the signer. Entered second grade of Louisville Public School and graduated at Louisville Male High School in June, 1880. Have also read law.

Dr. P. J. Billings, Louisville, Ky.

H. S. Wales, " "

Prof. M. H. Tyler, " "

Dr. E. A. Kuhnly, " "

8. If previously employed, give names of persons or companies employing, and give a particular account of how and where employed for last three years before entering this company's service, giving names and present addresses of employers, if known, and in case of companies, give names and present addresses of officers under whom employed, if known. Not previously employed.

9. Give particular account of employment by this company. Show in regular order date at which each position was assumed, department, occupation and salary paid. Feb. 9, 1881, stenographer in G. P. A.'s office, L. & N. R. R., to fill a temporary vacancy. Feb. 19, 1881, stenographer, etc., for Supt. Transportation, L. & N. R. R. Jan., 1882, was appointed chief clerk to Supt. Transportation.

10. Describe fully the duties of present position, say when it was assumed and give salary. Chief clerk in Div. Supt.'s office, L. C. & L. Div. since Jan. 1, 1884. Have charge of Road Dept. pay rolls and accounts, and Transportation Dept. pay rolls and accounts. Also perform a variety of general office work.

11. State for what department and position in railroad service you consider yourself best qualified, and give your reasons. I consider myself best qualified for a position in Transportation or Law Department, where a thorough familiarity with railroad accounts and a fair degree of skill as a stenographer may be required. Having a liberal education as a foundation, I think, by close application to business, I could make myself useful in a much wider field than the present position affords.

Signature: Chas. A. Johnson.

FORM 51, No. 241.

1. Ellis Mason.
2. Local Freight Agent at Mobile.
3. Demopolis, Ala., August 8, 1853.
4. Married.
5. Transportation Dept. at Mobile Station, on March 2, 1881, in capacity of Local Freight Agent.
6. Employment Continuous.
7. Blank.
8. 1st, Alabama Gold Life Ins. Co.; 2d, Bruce, Anderson & Kay, Hardware. 3d, First Natl. Bank, Mobile, Ala. 4th, L. & N. Express Co. 5th, L. & N. R. R. Co. Three months prior to my entering the service of this company, I was Agent of the L. & N. Express Co., and 8 years prior to this time I was Paying and Receiving Teller of the First National Bank, Mobile. Mr. Val Rose was Genl. Supt. of the Express, address not known. James H. Mason, Pres.; Lloyd Bowers, Cashier of First Natl. Bank, Mobile. Two previous employments: 1st, Company suspended; 2d, Suspended.
9. Have been continuously employed as Agent, from March, 1881.
10. I am Local Freight Agent, and have general supervision of Mobile Station, in so far as pertains to the receiving, delivering and forwarding of freight, and such other duties of an agent as may from time to time devolve upon him by instructions from heads of Transportation and Genl. Freight Departments.
11. Have served only in this Department. I prefer to continue in same. As to qualifications and position I am best fitted for, are questions I would rather the Company act upon, referring to the head of my Department for the manner in which I have performed the requirements of my present duties, and my qualifications for promotion.

Signature: Ellis Mason.

FORM 51, No. 290.

1. Caleb Parker.
2. Agt. & Yard Master in Frt. & Trans. Dept. at Decatur, Ala.
3. Dickson Co., Tenn., Nov. 22, 1839.
4. Married.
5. Transportation Dept. at Louisville Ky., Sept., 1863, in capacity of Brakeman.
6. Left the service in the year 1875 to take train on L. P. & S. W. R. R. Was re-employed in 1877 in the capacity of freight cond'r., and have since been continuously in the employ of this company.
7. H. C. Bunner, Nashville, Tenn.; S. B. Gordon, Bowling Green, Ky.; P. P. Spurr, Gallatin, Tenn.
8. Employed by John C. Fehr, bookbinder at Nashville, Tenn. Also by J. Barnard, bookbinder, all of Nashville, Tenn. In 1861 entered the army; was discharged at Tupelo, Miss., in June, 1862. Again employed by J. Barnard until service commenced on L. & N. R. R. John C. Fehr now resides in Nashville, Tenn. * * * Others deceased. Before entering service last time was employed on L. P. & S. W. R. R., under Supt. Dan Whitcomb.
9. Assumed position of brakeman Sept., 1863; promoted to cond'r. in 1874. Was appointed night yard master at Bowling Green, Ky., Dec. 6, 1882. Appointed agent and yard master at Decatur, Ala., Sept. 5, 1886.
10. Have general supervision of the Freight and Transportation Dept. at Decatur. Assumed position Sept. 7, 1886.
11. Will endeavor to fill any position the company may think proper to offer in Transportation Dept.

Signature: Caleb Parker.

The Stark Car Brake.

This simple and ingenious device was exhibited by means of a working model at the recent Master Mechanics' Convention, and is designed to enable the handbrake on a car to be set either from the roof or from the ground. It possesses one indispensable feature in a brake of this kind. It can be set from the roof and released from the ground or vice versa. Such a brake would save much time in switching and in setting out cars at way stations, while in working gravitation sorting yards, the advantage of being able to stop the car from the ground saves the necessity of a man riding on each car. The advantage in case of an impending "bump" is obvious.

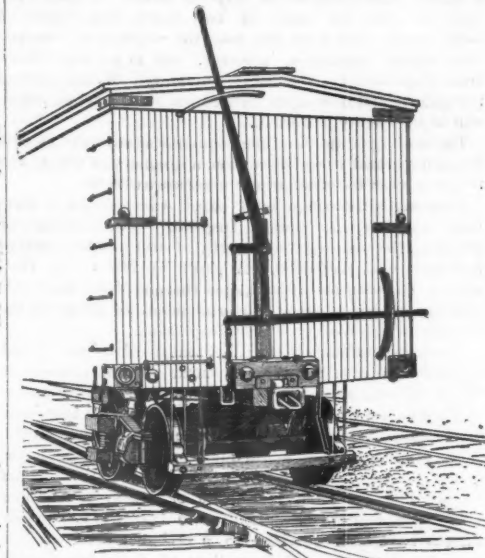
As will be seen from the engraving, the brake consists of

two levers, each operated by hand, one from the ground and the other from the roof. Each lever can be sprung into a ratchet holding it fast. When it is desired to take the brake off, one lever (no matter which) is tightened and let go, releasing the brake. If the brake has been set by means of the roof lever, tightening the side lever moves the roof lever out of the rack, and, consequently, when the side lever is let go, the roof lever being free of the ratchet also flies back, releasing the brake.

This brake has been in experimental use for nearly two years on various roads running out of Toledo, and has met with much favor from yard foremen, car inspectors and others, one of whom sums up its advantages as under: "First, the importance of the ground brake; second, the speed in which it can be set from the top; third, the convenience of releasing it at either point regardless of the point at which it had been applied; fourth, the entire attachment being in sight of inspectors."

It is claimed that it will neither release nor apply by the rattling or the swaying of the car.

It is, however, well to point out that the advantages of



Stark's Car Brake.

such a brake can only be fully obtained when the shoes are kept at a reasonable distance from the wheels. When the slack amounts to 3 in., or even more, per shoe, the ordinary hand brake can be applied if sufficient time is available, for a brake wheel can be twisted an indefinite number of times. The range of a lever is, however, limited, and unless the shoes are applied before the full travel is reached, the brake will have no effect.

Taking the average weight of an empty car at 22,000 lbs., it may be conceded that 16,500 lbs., or 75 per cent. of the weight, should be applied on the brake shoes. If each shoe has to move ½ in., the force required on the brake lever will be:

$$\frac{16500 \times 5}{8 \times 12} = 859 \text{ ft.-lbs.}$$

In other words if the brakeman can exert a push of 200 lbs., he will have to move the handle of the lever about 4 ft. 4 in., without allowing anything for the springing of the brake beams, levers, rods, etc. As it would be difficult to obtain 5 ft. travel, it is evident that to do good work the shoes ought, as in continuous brakes, to be kept not over ½ in. from the wheels.

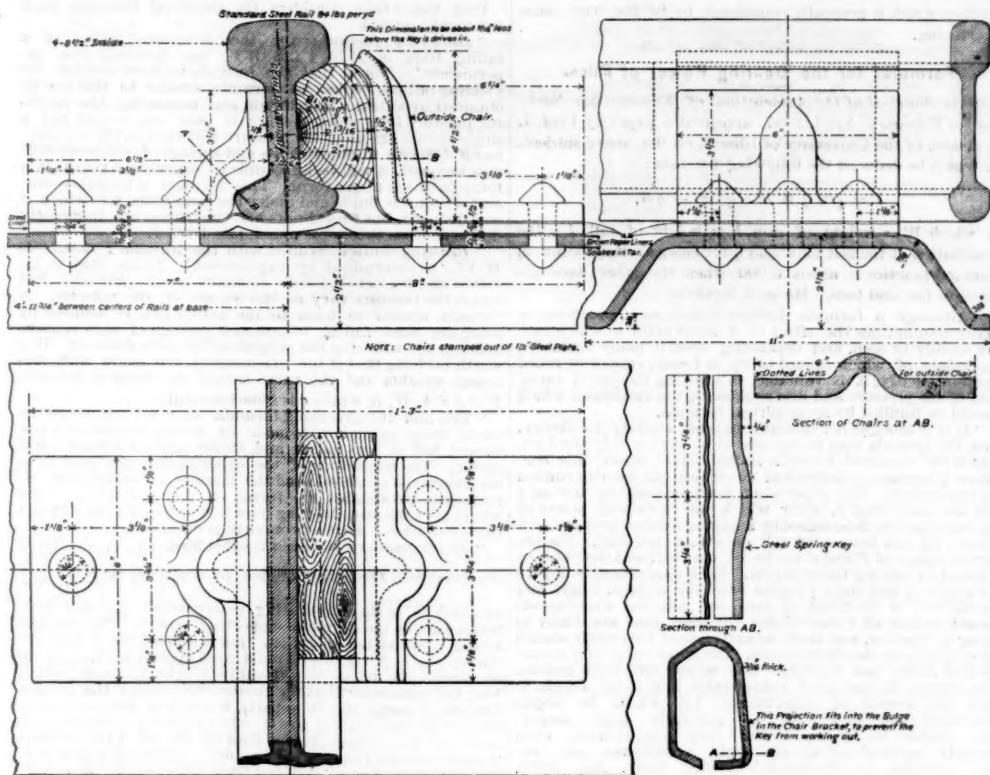
Permanent Way, London & Northwestern Railway.

Though English permanent way is universally conceded to be the best known, very little exact information has been published for many years as to the methods by which these excellent results are obtained. Statistics show that the cost of maintenance of way in England has fallen from 15.2 cents per train mile in 1875 to 11.81 cents in 1884, a reduction of 22 per cent. This fact alone should render interesting the following description and accompanying illustrations of the two systems of permanent way used on the main lines of the London and Northwestern. The subject is already exciting the attention of some American railroad managers, as the Pennsylvania have ordered one mile of the standard London & Northwestern track to be laid on wooden ties, and one mile to be laid on steel ties. The rail fastenings and ties will also be of English manufacture and the rails 90 lbs. per yard.

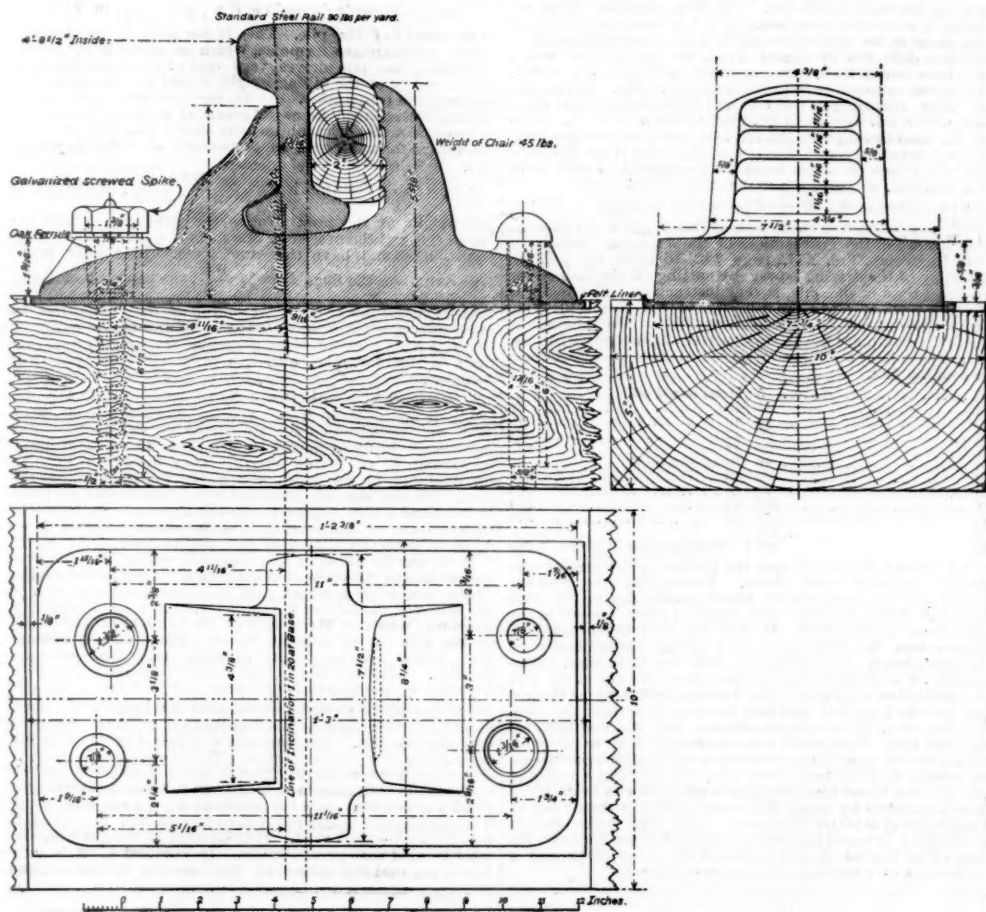
Both systems, referred to above and illustrated here, have to carry a heavy traffic, reaching on many parts of the main line 150 to 200 trains per day on each track. The heaviest load on any pair of driving wheels is 33,600 lbs., and the heaviest main line engine weighs 95,200 lbs., carried on three axles.

The system with steel ties is that patented by Mr. F. W. Webb, Mechanical Engineer of the road. The system with a wooden tie is the London & Northwestern standard, used generally on the main line until superseded by the steel tie system, after long trial of the two methods side by side. The wooden tie system represents fairly well the general practice on English railroads.

The rails in both systems are of very similar form, that known as the "bull head." It is not, like the "double-head," reversible, and the wear is solely taken on the head. The lower



F. W. Webb's Steel Sleeper System.



Wooden Sleeper System.

PERMANENT WAY, LONDON & NORTHWESTERN RAILWAY.

bulb or foot serves merely as the bottom chord of the rail considered as a girder. The absence of a thin flange enables the rail to be easily rolled, and the cooling being more even in different parts of the rail, there is less difficulty in producing straight rails.

A layer of tarred felt is interposed between the cast-iron chair and the yellow pine sleeper. The object of the tarred felt is to take up any inequalities between the chair and the sleeper, and to keep out the wet, it also tends to make the road more elastic and prevents the chair working on the sleeper.

The cast-iron chair provides considerable width of bearing on the tie, and minimizes the tendency of the rail to cut and sink into the tie. The chair also enables the fastenings to be spread a considerable distance apart, 11 in. in this case, giving them greater leverage against being pulled out of the tie by the side blow of the wheel flanges on the head of the rail.

The fastenings used with the wooden tie system consist of one galvanized screwed spike and one cylindrical spike for

each chair. The screwed spike cannot be driven by a hammer without injuring the little tit on the head. As the spike is screwed down, the taper shank tightens in an oak ferrule.

As the holes for the screwed spikes are cast in the chairs, the oak ferrules are used to obtain practically a mechanical fit, without mechanical refinement, the neck of the spike being made taper so as to force the ferrule into the inequalities of the hole.

The cylindrical spike is driven down into a hole previously bored in the tie. This hole is slightly smaller than the spike, which thus fits tightly. Each chair has four holes bored in it, one for a screwed spike and one for a cylindrical spike on each side. When the tie is first laid down only two of these holes are used and the other two remain unfilled.

Whenever the fastenings become loose, fresh fastenings can be placed in the spare holes without disturbing the old holes either in the chair or sleeper. A similar arrangement is almost universal in English permanent way.

The fastenings are not much superior as fastenings to

spikes as used here, but they are better placed to resist strain and wear. The upward pull of the chair comes fairly on the head of the fastenings illustrated, while our spike has to resist a strain on one side only of the head. While spikes here are very generally cut by the thin flange of the rail owing to the small and one-sided bearing surface, the chair gives an ample surface all round, and the shank of the screwed spike is protected as described above. While with flat-footed rails the outside spikes alone assist in preventing the spreading of the rail, a glance at our illustrations will show that both inside and outside fastenings assist in preventing any widening of the gauge. These are very solid advantages, and account largely for the fact that derailments rarely occur in England, despite the use of heavy engines, often with a rigid wheel base, run at very high speeds. Where flat-footed rails are used, the Board of Trade insist that fang bolts must be used at the joints and in the middle of the rail, flat-footed rails wholly secured by spikes not being considered safe for passenger traffic.

The advantages above enumerated are, however, gained at some expense, and involve considerably greater weight. A yard of track weighs as under, taking the usual English pitch of ties, one yard:

Two rails.....	Lbs. 180
Two chairs.....	90
Total.....	270

The same amount of vertical strength could be obtained by flat-footed rails of 100 lbs. per yard, making a corresponding total weight of 200 lbs. The bearing on the ties would, however, be only about 40 per cent. of that obtained by the use of the chairs, and the fastenings would be only about 5% in. instead of 11 in. apart centre to centre.

The steel sleeper shown is the latest pattern used on the London & Northwestern. This system of steel tie and chair, etc., has now been in use since the middle of 1880, and some 55,000 of these sleepers are now in use on the London & Northwestern, besides sample lengths on other English roads.

The general design is similar to that for the wooden sleeper; a bull-head rail held by a key in a chair resting on the tie. The chair, however, instead of being one casting consists of three steel strips, stamped to shape under a steam hammer.

One of the three pieces of which the chair is composed is placed between the rail and the tie, so as to stiffen the latter locally, and prevent the heavily loaded rail breaking through the thin steel tie. The two other pieces of the chair hold the rail laterally. After the rail is dropped into the chair, the key is driven parallel with the rail, and holds the rail firmly to gauge.

The key may be of compressed oak, as in the wooden sleeper system, or a steel spring key may be used, as shown in detail in the lower right-hand corner of the illustration of the steel tie system. The chairs are made with a recess, into which the key springs after being driven. The key cannot thus slack back. The keys being placed on the outer side of the track, any side blows of the wheel flanges are cushioned and the chances of spreading the track are lessened.

The great objection to keys has always arisen from their being affected by changes in the weather. When the weather is hot and dry, the wooden key shrinks, and, becoming loose, is liable to drop out. In damp weather the key swells, and is apt to burst the chair if originally driven so tightly that it can never shrink sufficiently to become loose in dry weather. The steel spring key is not open to these objections, but, of course, if it should break it becomes useless, whereas the wooden key cannot break, and being of seasoned oak will not rot.

In the wooden tie system, the key when driven expands into the grooves shown in the inner face of the chair. The ridges on the grooves prevent the key slacking back.

As in the wooden tie system, the chair does not rest directly on the sleeper, a piece of tarred paper being interposed. The object of the pieces of tarred paper between the chair and sleeper is to keep out the moisture and prevent sliding or working between the chair and the packing, and the packing and the sleeper. The gauge of the track being fixed absolutely by the position of the rivets, insures one advantage, that of correct gauge, but of course renders it more difficult to adjust or change the gauge. Should a rail on a curve become so worn inside of the head as to widen the gauge, it can be corrected by simply changing the outside rail of the curve to the inside, and the inside rail to the outside of the curve.

This is, however, seldom found necessary on the London & Northwestern, though it is done on the Underground and other English lines.

The accompanying diagrams, Figs. 1 and 2, will show how

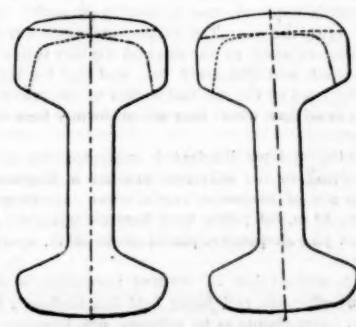


Fig. 2.

Fig. 1.

easily this can be done with rails laid with "cant," i. e., with the rail inclined inward to suit the coning of the wheel

tread. This is the universal practice in England, and though a little more troublesome and expensive to arrange in the first instance, the rail is worn away fairly perpendicular to its vertical axis, and will therefore present a fair face when transferred from the outside to the inside of a curve.

Fig. 1 shows the rail as laid with cant, and Fig. 2 shows the rail as it would appear when laid without cant. The full lines show the original section, the plain dotted lines show the wear on a curve widening the gauge, and the dot and dash lines show the rail then reversed from the outside to the inside of the curve. It will be noticed that where laid without cant the reverse inclination of the wearing surface would throw the wear almost wholly on the inner edge, producing an intense local pressure, with consequent rapid wear.

For ordinary use the sleepers are sawn off straight, though a few have been made with flattened ends just to show that they can be made so if required, but where the plain sleepers have been in use on sharp curves and heavy gradients, it has not been found necessary to make any provision to prevent lateral motion.

The dimensions, weights, etc., of the two systems are as follows:

	Steel tie system.	Wooden tie system.
Rail:		
Weight per yard.....	84 lbs.	90 lbs.
Depth.....	5 3/4 in.	5 3/4 in.
Width of head.....	2 3/4 "	2 3/4 "
Depth of head to intersection of fishing angles.....	2 "	1 3/4 "
Thickness of web.....	1 1/8 "	1 1/8 "
Depth of foot to intersection of fishing angles.....	1 3/4 "	1 3/4 "
Radius of upper corners of head.....	1 1/8 "	1 1/8 "
Ties:		
Length.....	9 ft.	9 ft.
Breadth.....	11 in.	10 in.
Depth.....	2 3/4 "	5 "
Thickness.....	1 1/8 "	1 1/8 "
Chairs:		
Length bearing on tie.....	15 "	14 3/4 "
Width.....	6 "	7 3/4 "
Area.....	90 sq. in.	111 sq. in.
Weight of one tie complete.....	lbs.	lbs.
Two chairs.....	48	90
Fastenings, liners, etc.....	136	140
One tie.....	184	242

It will be seen from this table that the steel tie presents several advantages. The bearing surface of the tie on the ballast is 10 per cent. greater, while the total weight of tie and chair complete is only 76 per cent. of that with the wooden tie system.

The steel tie system has also a great advantage in the nature of its fastenings. Both spikes and trenails are all unsatisfactory fastenings, liable to become loose, but six rivets, once closed by hydraulic riveting, form a truly permanent grip. The key is used alike in both systems, but Mr. Webb's method of holding it by a bulge in the chair is said to effectually prevent any slacking back, and the greater elasticity of the steel chair will enable it to spring slightly when the key swells and the cast-iron chair might burst.

In both systems it will be noticed that the holes can be drilled by machine in the tie and the chair fastened to the tie in the workshop before being sent on the road. The gauge is then bound to be right, and when the ties are laid, the rails have simply to be dropped in the chairs, and the keys driven. It need hardly be pointed out that this system requires less skill in tracklaying and gives greater accuracy than spikes, which must be driven tentatively before the right gauge is secured.

The height from the bottom of the tie to the top of the rail is 8 3/16 in. with the steel tie system, and 12 1/2 in. with the wooden tie system. This difference is a decided advantage in favor of the steel ties, except as regards frost. The ballast on which the wooden ties rest being at a greater depth beneath the surface, would probably be less affected by frost; but in a warm climate this would not be an advantage, while the smaller depth would mean an economy in construction and amount of ballast required.

It is usual on most English and many European roads to not only cover the ties completely with ballast, but on the outside of the rail to trim level with the top of the rail, and 2 in. lower in the four foot, so as to prevent wheel flanges touching. The thickness of ballast above the main bearing surface of the tie would then be 12 to 10 in., with the wooden ties, and 4 to 6 in. with steel ties. This great thickness protects the bearing surface of the ballast against the effects of any moderate frost, and in combination with good drainage and wide side ditches carefully kept clean prevents any trouble from frost in Great Britain. Some lines in Scotland, the North British for example, trim the ballast level with the top of the tie. The arguments in favor of this practice are that the fastenings are more readily accessible, less ballast is required, and a smaller quantity has to be moved to tamp the tie. The arguments against it are that the tie being exposed to the sun and weather is more apt to split and crack, and ultimately rot, and that the keys being alternately dried by the sun and wetted by the rain are more apt to get loose than where they are uniformly kept damp by the ballast.

In both the systems illustrated suspended fish points are used according to the universal practice in England. The fish plates are of moderate length, never exceeding 24 in., as the long 44 in. fish plates used here are unknown abroad. The yellow pine sleepers are placed about 36 in. apart centre to centre.

It will be noticed that no positive prevention is provided against creeping, the rail being held longitudinally by friction only. Complaints as to creeping are, however, seldom heard. The foot of the rail after a little wear becomes indented where it rests on the chair, and that, with the grip of the key, appears to prevent creeping. The great vertical strength of the rail probably also prevents that excessive

bending which is generally considered to be the true cause of creeping.

Formulas for the Bearing Power of Piles.

In the *Journal of the Association of Engineering Societies* for February-April, 1887, appeared a paper by Prof. I. O. Baker, of the University of Illinois, on the above subject, in which he deduced the following formula:

$$P = \sqrt[3]{2qWh + q^2d^3} - qd,$$

in which W = weight of ram, h = height of fall, d = the penetration at the last blow and q for cases as they occur in common practice is about 6,000 when the other data are given in feet and tons. He says, however:

"Although a formula derived in this way, involving so many assumptions the effect of a small error in which cannot readily be seen, and depending upon so many variables, the values of which cannot easily be found, cannot be relied upon implicitly, it is valuable as showing the law of variation of the pressure and also as showing the conditions which should be fulfilled by an empirical formula.

"If it is thought not desirable to trust entirely to theory, then the formula may be considered as giving only the form which the empirical formula should have; under this condition q becomes a numerical co-efficient to be determined by experiment. The experiment must be made by driving a pile and measuring d , after which the sustaining power of the pile must be determined by applying a direct pressure. Of course, the last blow must fall on sound material. The observed values of P and d are to be inserted, and the value of q found by solving the equation. Each experiment will give a value of q , and since q varies with the section, length and co-efficient of elasticity of ram and pile, the experiments should include all values of the variables that are likely to occur in practice, and those occurring most frequently should predominate in the experiments. The mean value of q should be used in the final formula. The writer has been unable, even though he has spent considerable time in the search, to find any record of experiments by which he might determine the value of q ; generally some important factor is lacking. The only experiments, even roughly approximating the right conditions, are the two recorded in Trautwine's Pocket Book, Ed. 1885, pp. 643-4. These are unsuitable for this purpose, since we know certainly that for one of them (the second) the last blow was not struck on sound wood, and as it is highly probable that for the other it was not. The first example (after reducing to a 2,000-lb ton) makes $q = 1.5$; assuming, as seems reasonable in the light of the above table, that if the last blow had been delivered on sound wood, the penetration would have been nearly three times as much, will give $q = 6,000$. The second example as recorded makes $q = 835$. In this case we know that the pile had received 59 blows of a light hammer, with a fall increasing gradually from 6 to 35 ft. without the head having been cut off, and that hence the last blow was not struck on sound wood; assuming that if the last blow had been struck on sound wood the penetration would have been doubled, will give $q = 6,000$."

With regard to the effect of brooming, he says:

"In this connection the following table, given by Don J. Whittemore in the *Transactions of the American Society of Civil Engineers*, Vol. XII., page 442, to show the gain in efficiency of the driving power by cutting off the bruised or broomed head of the pile, is very instructive. The pile was of green Norway pine; the ram was of the Nasmyth type, and weighed 2,800 lbs.; the face was 36 in. The numbers in the first column are the successive feet of penetration; in the second the number of blows required to drive the pile the corresponding foot.

3.....	5	Head adzed off.	
4.....	15	15.....	275
5.....	20	16.....	572
6.....	20	17.....	832
7.....	35	18.....	825
8.....	46	19.....	
9.....	61	20.....	213
10.....	73	21.....	275
11.....	109	22.....	371
12.....	153		378
13.....	257		
14.....	684	Total number of blows.....	5,228

"A similar pile driven near the former, under similar conditions, required 9,923 blows. Notice that the average penetration per blow was 2 1/2 times greater during the 15th foot than during the 14th, and nearly 4 times greater in the 19th than in the 18th. It does not seem unreasonable to believe that the first blows after adzing the head off were correspondingly more effective than the later ones; consequently, it is probable that the first blows for the 15th foot of penetration were more than 5 times as efficient as the last ones for the 14th foot, and that the first blows for the 19th foot were 8 or 10 times more efficient than the last ones for the 18th foot. This shows how unscientific it is to prescribe a limit for the penetration, without specifying the accompanying condition of the head of the pile, and also that a volley of two or three blows (the penetration per blow can be obtained more accurately by taking the mean for two or three than by a single blow) is better than more. Also since the co-efficient of elasticity of sound material is included in the formula, the head of the test pile should be sawed off so as to present a solid surface for the last or test blow of the ram."

Prof. Baker then considers the empirical formulas most commonly quoted.

"*Haswell's formula* for the dynamical effect of a falling body is $P = 4.426 WV$, 'as deduced from experiments.' Notice that the formula neglects entirely the yielding of both bodies. A formula similar to this can be obtained by letting a weight fall, and measuring the resulting pressure by a coiled spring: if only one weight and a single spring are used, the pressure will vary as the velocity; but if different falling weights and springs of different stiffness are used, it will be impossible to express the results in a formula of the above form. This formula is probably correct within the limits and under the conditions for which it was deduced, but these limits and conditions are immensely different from those of common pile driving.

"*Beaufoy's* is often credited with the formula $P = 0.5008 W V^2$, 'as determined by experiment.' Notice that it involves and neglects the same elements as the preceding, but makes the pressure vary as the square of the velocity. A formula similar in form to the above can be deduced by using the same falling weight and springs of such relative stiffness as will stop the weight in the same distance. It is worth noticing that if the experiments are made with different weights and the same spring the formula becomes $P = cv\sqrt{W}$, in which c is some constant.

"This and the preceding formula were without doubt deduced from experiments made by letting weights of a few ounces fall a few inches and strike against a small spiral spring. The magnitude of the experiments was such as to invalidate the constants, and the manner of making the experiments invalidates the forms of the equations. They would give the same bearing power for all coils, other things being the same. Further comment is unnecessary.

"*Major Sanders' formula* is often used by U. S. Army engineers and frequently quoted by others; it is $P = \frac{Wh}{8d}$,

in which P is the safe bearing power, which is some fractional part of the ultimate supporting power. The original article is not at hand, and it is not known how it was deduced. * * * If this formula were applied to the case of an elastic pile driven in soft soil by a light hammer with a long fall (remember that the greater the velocity the greater the loss of energy due to impact), it will give nearly or quite infinity for the bearing power, when probably a steady pressure only a few times greater than the weight of the hammer would force the pile into the ground. Although it is always referred to as being 'deduced from experiments,' it is difficult to believe that such is the case; it looks very much like a crudely approximate theoretical formula.

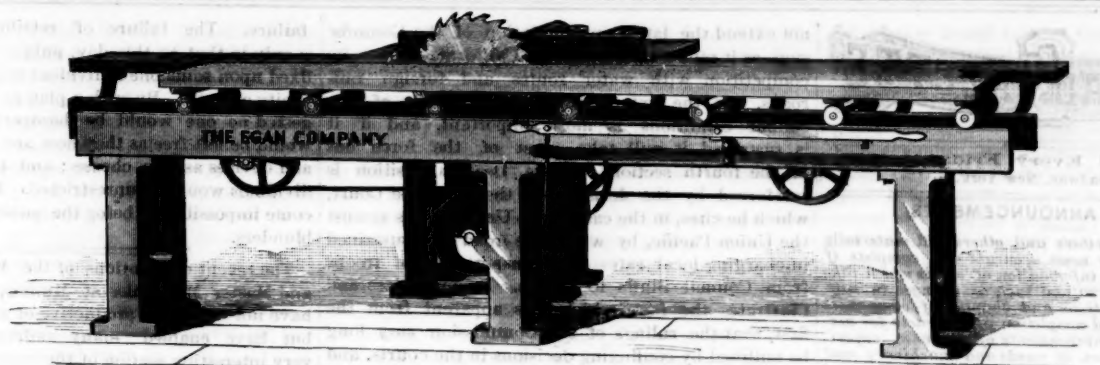
"*Colonel Mason's formula* is $P = \frac{W^2h}{(W+w)d}$, in which w is the weight of the pile. This is the same as one of Weisbach's approximate formulas, which he states is applicable only when the pile drives very easily; it assumes that the whole energy of the falling weight is used in overcoming the resistance to penetration. As in the preceding case, this is frequently referred to as a 'practical formula,' but an examination of the original memoir shows that it is wholly a theoretical formula, with no pretensions of being anything else. * * *

"*Nystrom's formula* is $P = \frac{W^3h}{(W+w)^2d}$, in which w is the weight of the ram. Notice the similarity in form between this and the preceding one; since it involves the same terms, it should have the same form. In a later book, Nystrom gives the form $P = \frac{Wh}{d}$, the assumption being

that 'about 25 per cent. of the energy of the ram is lost by the crushing of the head of the pile' (italics by the writer of this article). Both of these formulae are roughly approximate rational formulae, although often cited as 'practical formulae.'

"*McAlpine's formula* is $P = 80 (W \text{ tons} + 0.228 \sqrt{h} \text{ ft.} - 1)$. It was deduced from experiments made in connection with the construction of the Brooklyn dry-dock. 'The piles were chiefly of spruce timber from 25 to 40 ft. long, averaging 32 ft. driven length. They were from 12 to 18 in. diameter at the head, and never less than 5 in. at the foot. The soil was silicious sand with comminuted particles of mica and a little vegetable loam and generally encountered in the form of quick-sand. The hammers weighed from 1,000 to 4,500 lbs.; the final fall varied from 35 to 40 ft.' Concerning the form of the equation, notice that it makes one portion of the pressure due to impact vary as the weight of the ram, while a second part varies as the square root of the height of the fall, or the velocity, and a third portion is constant whatever the weight of the hammer or the height of the fall. It is difficult to see what the conditions are which make this division of the pressure possible. Notice also that the formula gives a negative or imaginary result when $(W + 0.228 \sqrt{h}) < 1$; the author of the formula provides for this limit by the statement that 'the formula is not applicable to rams weighing less than one ton.' Consequently it is inapplicable to many cases likely to occur in practice. This limitation is remarkable when it is remembered that it was deduced from experiments made with rams weighing from 1,000 to 4,500 pounds. Finally notice that since the penetration per blow is not used, it is inapplicable to any soil differing from that for which it was deduced—quick-sand. This formula is not general, and must be used with great caution. In conclusion, it is only fair to say that the author of this formula in the original

Name of formula.	Formulas.	Bearing power.	
		1st ex.	2d ex.
Haswell's.....	$P = 4.426 WV$	72,000	352,800
Beaufoy's.....	$P = 0.5008 W V^2$	147,000	1,600,000
Sanders'.....	$P = \frac{Wh}{d}$ (The factor 8 of the d nominator is omitted).....	146,000	1,600,000
Mason's.....	$P = \frac{W^2h}{(W+w)d}$; W = weight of the pile.....	52,500	886,000
Nystrom's 1st.....	$P = \frac{W^3h}{d(W+w)^2}$; W = weight of pile.....	10,000	490,000
Nystrom's 2d.....	$P = \frac{Wh}{d}$	9,000	1,200,000
McAlpine's.....	$P = 80 (W + .228 \sqrt{h} - 1)$	minus.	185,000
Trautwine's.....	$P = \frac{0.023 \sqrt{Wh}}{d+1}$	58,800	219,000
Rankine's.....	$P = \sqrt{\frac{4WhSE + 4d^2s^2e^2}{1} - 2ds}$	123,000	851,000
Weisbach's.....	$P = \frac{H}{H+H_1} \left(\sqrt{2 \frac{H+H_1}{H_1} Wh + d^2} - s \right)$; $H = \frac{SE}{L}$, $H_1 = \frac{s}{l}$	111,000	508,900
Baker's.....	$P = \sqrt[3]{12,000 Wh + 36,000,000 ds} - 6000 d$	129,000	686,000



SELF-FEEDING CARRIAGE EDGING SAW (WITH ROPE FEED).

Made by the EGAN COMPANY, Cincinnati, Ohio

memoir distinctly stated its limitations, and therefore is not responsible for its frequent misuse.

"Trautwine's formula is $P = \frac{0.023 \sqrt{h \text{ ft. } W \text{ tons.}}}{d \text{ inches} + 1}$ [See letter below.]

"The tabular view below will show the divergency of the most common formulas. Bear in mind that of the first eight, all of which are generally classed as being derived from experiment, only the last two—McAlpine's and Trautwine's—were derived from experiments on actual piles. The first example is the somewhat celebrated Proctorsville pile, which was tested, and bore 59,618 lbs. without moving, but moved very slowly under 62,500 lbs. The hammer weighed 910 lbs., and fell 5 ft.; the penetration was $\frac{3}{8}$ of an inch. Notice that Mason's formula agrees fairly well with the actual load. In applying the last three formulas it was assumed that the last blow was struck on sound material, which clearly was not the case. If the last blow had been struck on sound wood the penetration would have been much greater, and the bearing power correspondingly less; assuming the penetration for a blow upon sound wood as twice the recorded value, will give almost exactly the bearing power found by experiment.

"The second example is an imaginary pile, although the conditions are those of ordinary practice. It is given to illustrate the divergency of the different formulas under different conditions. The hammer weighed 1 ton, and fell 25 ft.; the remainder of the data is as before.

"It is claimed for the formula deduced above that it is more simple in form than any other rational formula, that it is as easily applied as either of the formulas deduced from experiments, and that it is far more general than many of the empirical formulas. The value of q was deduced from purely theoretical data, and some evidence cited to show that it agreed fairly with experiment. No data are available to satisfactorily determine the quantity, but no data have been found showing that the value deduced from a theoretical basis is seriously in error. The question for the engineer to decide is whether he is better off with a general formula of correct form and approximate constants, or with a formula incorrect in principle, having unknown limits and approximate constants. If any one knows of any data or will make any experiments suitable for the purpose, the writer will gladly discuss them and deduce a value for the term q in the preceding formula."

Mr. John C. Trautwine, Jr., sent the following letter to the *Journal of the Association of Engineering Societies*, but as the publications in that journal are limited to papers read before the societies it is printed here by permission of the author.

3301 HAVERFORD ST.,
PHILADELPHIA, June 7, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Journal of the Association of Engineering Societies* for February-April of this year is a paper by Prof. Ira O. Baker upon "Formulas for Bearing Power of Piles," from which I quote as follows (p. 127):

"Trautwine's formula is

$$P = \frac{0.023 \sqrt{h \text{ ft. } W \text{ tons}}}{d \text{ inches} + 1}$$

"* * * if a light ram with long fall be used on a long heavy pile the penetration (d) may be nearly or quite zero, and consequently the bearing power will appear to be nearly infinite, while in fact it would probably be but a few times greater than the weight of the ram. It is not stated how it was deduced."

I am glad to be able to indicate the manner of its deduction. In the first (1872) edition of "The Pocket-Book" is given a formula exactly identical with the present one in form, and almost so in its co-efficients; and, referring to said formula, its author says, "Although this is all wretchedly empirical, it certainly appears to accord moderately well with such facts as we have been able to obtain. Like other rules of this kind, however, it should be used with caution, and with a wide margin for safety in important cases."

Professor Baker, no doubt by a slip of the pen, has misquoted our formula in the passage cited above. It requires the weight (W) of the ram in pounds and not in tons. The load (P) given by our formula is the total extreme load, in tons of 2,240 pounds, on the pile. From Professor Baker's definition of his symbols P would appear to be the load per unit of area of cross section of the pile, but it is evidently intended to represent the total load, as in our formula, so that the load per unit of area of cross section of pile would be represented by

$$\frac{P}{s}$$

In remarking that where there is little or no penetration our formula gives a load nearly infinite, as Major Sanders does, Prof. Baker must, I think, have overlooked the term 1 in the divisor, the presence of which prevents P from exceeding the numerator

$$\sqrt{\text{fall in feet} \times \text{weight of hammer in lbs.} \times .023}$$

No.	Location, etc.	Data obtained from.
1	U. S. Gov't trial pile.....	Trautwine's Civil Engineers' Pocket Book, p. 644.
2	Philadelphia, 1873.....	Trautwine's Civil Engineers' Pocket Book, p. 643.
3	Brooklyn Navy Yard.....	McAlpine, Journal of Franklin Institute, Feb.-Mar., 1883.
4	Pensacola Navy Yard.....	Memoir on Foundations in Compressible Soils. Gen. Rich'd Delafield.
5	Elevator at Buffalo, N. Y.....	Letter to the writer from Mr. W. A. Haven.
6	Royal Boder Bridge, England.	Trautwine's Civil Engineers' Pocket Book, p. 643.
7	Girard Point, Phila., 1873.	Private Note-book, J. C. Trautwine, Sr.
8	Hull Docks, England.....	Trautwine's Civil Engineers' Pocket Book, p. 643.
9	French Engineers' Practice....	Trautwine's Civil Engineers' Pocket Book, p. 644.
10	Neuilly Bridge, Paris.....	Trautwine's Civil Engineers' Pocket Book, p. 643.
11	Chestnut St. Bridge, Phila....	Trautwine's Civil Engineers' Pocket Book, p. 643.
12	Fort Montgomery, N. Y. State	Memoir on Foundations in Compressible Soils. Gen. Rich'd Delafield.

No.	Weight of ram.		Fall of		Last sinking.	
	Lbs.	Tons of 2,000 lbs.	ram, ft.	$\frac{1}{2}$ Fall ft.	Inches.	Feet.
1	910	.455	5	1.71	.375	.031250
2	1,600	.800	36	3.30	18.000	1.500000
3	2,240	1.120	30	3.11	.500	.041670
4	2,200	1.100	30	3.11	.500	.041670
5	1,900	.950	29	3.07	1.500	.125000
6	1,700	.850	16	2.52	.650	.004167
7	1,650	.825	44	3.53	12.000	1.000000
8	1,500	.750	24	2.88	2.000	.166700
9	1,344	.672	4	1.59	.013	.001083
10	2,000	1.000	5	1.71	.013	.001083
11	1,200	.600	20	2.71	.750	.062500
12	1,630	.815	36	3.30	2.500 to 6.500	.208300 to .541700

TOTAL LOAD ON ONE PILE IN POUNDS.

No.	Actual.		Calculated Ultimate.	
	Apparently safe.	Ultimate.	By Baker's formula $P = \frac{1}{2} \sqrt{\frac{12,000}{W} + 36,000,000d^2} - 6,000d$ P and W in tons of 2,000 lbs. h and d in feet.	By Trautwine's formula $P = \frac{1}{2} \sqrt{\text{fall in ft.} \times W \text{ lbs.} \times .023}$ P = tons of 2,240 lbs.
1		60,500	120,000	58,240
2		14,900	38,000	14,336
3		224,000	872,000	239,200
4		91,800	860,000	235,000
5		75,000 A 100,000 B 150,000 C	390,000	120,000
6	157,000		72,000	210,100
7	22,400		72,000	23,100
8	44,800			
9	56,000		206,000	74,300
10	105,300		348,000	108,400
11	40,300		478,000	173,800
12	34,100		318,000	95,900
			268,000	79,300
			108,000	37,000

in any case, so that even with a 64-ft. fall of a 3,000-lb. hammer, and no penetration, our formula would give

$$\text{ultimate load on pile} = \frac{\sqrt{64 \times 3000 \times .023}}{1} =$$

$4 \times 3000 \times .023 = 276$ tons of 2240 lbs. = 618,240 lbs., which would probably not greatly exceed the truth.

I annex a table giving a comparison of Professor Baker's formula, and of our own, with the observed facts in such cases as I have been able to find recorded, much regretting

that I am unable to do justice to Professor Baker's formula because it requires that we should either know the length, cross section and co-efficient of elasticity of both ram and pile, and "the distance the lower end of the pile is moved by the last blow," or else adopt his co-efficient " q ," which, as he explains, has been deduced from the only obtainable, but very insufficient, data. As the factors named are not given in the instances at my command, I am compelled to resort to the use of " q ," which puts the Baker formula into the shape given on page 128, and to content myself with the sinking of the pile as observed at its head. Under these circumstances it could hardly be expected that the formula should give even approximate results, and I am uncertain which two out of the seven or eight instances named in the "Pocket Book" Professor Baker has selected for the determination of " q ," but from the fact that his formula, as thus misused, gives results uniformly greater than those observed, it would seem that " q " has been taken too large.

Of course the comparison is of little value in the last seven cases, in which the experimental load is the apparently safe one and where the actual extreme load is not known.

JOHN C. TRAUTWINE, JR.

Self-Feeding Carriage Edging Saw.

We illustrate herewith a new self-feed carriage edger, designed for edging up stuff accurately and rapidly, especially where parties need a machine that will stand up to heavy work. It is made by the Egan Company, Cincinnati, O., from whose catalogue the following description is taken:

The frame and ways are of iron planed perfectly true. The table is of wood and is built up and placed upon rollers and brackets.

The carriage is fed forward by the movement of a lever which puts in motion a drum carrying a rope to which the carriage is also attached. The carriage is reversed by a reverse motion of the lever; it is fed back at a very rapid speed at about the rate of three to one forward. The lever will be found convenient to operator at any place he stands.

The patent friction device for feeding forward and reversing the motion of the carriage is claimed to be the most complete, perfect and durable ever put on a machine of this class, and it is stated that there is no possibility of its getting out of order, and it is made on the most scientific principles to prevent any possible wear.

When desired the machine will be furnished with carriage to move by hand power, thus making a first-class machine for hand edging.

Five sizes of this machine, 12, 14, 16, 18 and 20 ft. in length, are made, and any special length can be made to order. A patent expansion extra heavy saw mandrel is furnished with each machine, and an adjustable fence moving in a dovetailed groove.

The loose and tight pulleys are 12 in. in diameter by $6\frac{1}{2}$ in. face and should make 800 revolutions per minute.

For further particulars and prices of this or cuts and prices of any other improved wood-working machinery address the manufacturers, the Egan Company, Cincinnati, Ohio.

Car-Heating Law in Massachusetts.

The following is the law passed at the last session of the Massachusetts Legislature:

"No passenger, mail or baggage car on any railroad in this commonwealth shall be heated by any method of heating, or by any furnace or heater, unless such method or the use of such furnace or heater shall have been approved in writing by the board of railroad commissioners; provided, however, that in no event shall a common stove be allowed in any such car; and provided also, that any railroad corporation may, with the permission of said board make such experiments in heating their passenger cars as said board may deem proper. Any railroad corporation violating * * * shall forfeit a sum not exceeding \$500."

At the same time the legislature instructed the board of commissioners to investigate the subject of providing better and safer methods of heating and lighting passenger cars, and to report to the next general court the result, with recommendations.

The Nicaragua Canal.

We are informed by those interested in the Nicaragua Canal project that a valuable concession has been obtained from the Government of Nicaragua; that the stipulated guarantee payments have been made, and that ample funds are in hand for the final detailed surveys and other preliminary work, preparations for which are now being made. Eight or more parties of engineers, fully equipped, will take the field in a short time, and vigorous work of construction will be begun almost immediately after.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The disadvantage in using special cars, such as the Burton stock car, which results from their being ill-adapted to the carrying of any freight except that for which they are built, is of considerable more consequence west of Chicago than on eastern roads, and the Chicago, Burlington & Quincy in meeting the case brought before the National Commission by the Burton Company scores a point upon it. No road likes to haul empty cars, but the roads between the seaboard and Chicago have to do it, and so cannot make such very great objection to stock cars that cannot be used for west-bound traffic. The large traffic in lumber, salt, iron and other coarse freights from Chicago westward, however, gives the roads in that territory a profitable west-bound business, and they can with perfect fairness make an additional charge for an inconvenient car. Moreover the profit from the added benefits of an improved car ought not perhaps to go wholly to the inventor of the car; the care of it by the railroad deserves some recompense. Refrigerator cars are practically worthless for west bound business, and the railroads rightly regard the freight carried in them as properly subject to an increased charge; the fact that the roads have carried dressed beef at less than cost does not alter the case or show that sacrificing profits in that way is pleasant to them. Gen. Butler, in cross-examining General Manager Stone at the hearing before the Commission, tried to cast a slur upon him as a manager who was better acquainted with luxurious "office" idleness than with the real working of a railroad; but Mr. Stone's testimony doubtless soon disabused him; and the effect of the trick was lost on the spectators, many of whom knew Mr. Stone and his reputation as a clear-headed manager.

A judicial interpretation of the fourth section of the Inter-state law has just been rendered which, if generally adopted, would go much beyond any interpretation yet given by the United States Commissioners in relieving the railroads of the effect of the long and short haul clause. It is made by Judge Deady in the application of the receiver of the Oregon & California. Judge Deady cites his own decision of two years ago in the case of the same road seeking relief from the long and short haul provision of the Oregon law, and in which the principle was laid down that "a railroad corporation has a right to live." He says that this opinion has been before the world for more than two years, and has received no unfavorable criticism, and adds that time and reflection have fully satisfied him of the correctness of the ruling. He holds that freight carried to or from competitive points is always carried under conditions and circumstances substantially dissimilar from those under which it is carried to non-competitive points. That is, competition controls the charge, and the power of a corporation to fix rates is limited thereby. It must take what it can get or abandon the field. Competition then is the most powerful and effective circumstance in introducing the element of dissimilarity. This reasoning leads Judge Deady to exempt the Oregon & California from the operation of the fourth section so far as concerns traffic between Portland and San Francisco, which must be taken in competition with the Canadian Pacific, and the Oregon Pacific with steamboats on the Willamette River. In its application to the special case this ruling does

not extend the latest interpretation of the Commission, as it relieves the Oregon & California, only in its competition with water routes and foreign railroads, but the extension of the definition of dissimilar conditions is most important, and if it is sustained it will take most of the force out of the fourth section. Judge Deady's position is reinforced by the decision of the Supreme Court, which he cites, in the case of the United States against the Union Pacific, by which the road was sustained in charging local rates for transportation of troops from Council Bluffs to Ogden. It emphasizes and illustrates the fact, which was apparent from the first, that the rulings of the Commission may long be nullified by conflicting decisions in the courts, and that a law is not a law until its interpretation is settled.

The discussion by the American Society of Civil Engineers of the question of legislation to secure proper bridge inspection, and to add in other ways to the security of travelers by railroad, is of much interest, and considerable space is given to it in this issue. The verbal discussion which followed the reading of the communications on the subject, was less specific in suggestions, but quite as important in expression of opinion as that which is abstracted elsewhere, and will be given to the readers of the Railroad Gazette when the notes of the stenographer are written up. So far it cannot be said that there is anything like agreement of opinion. Doubtless there must be further discussion before the majority of the society make up their minds definitely as to what to recommend. Most of those who expressed themselves were in favor of some legislation, but there was weighty opinion against any, and a decided feeling that it should be general, and should relieve the companies of no responsibility, and so far the question is simple enough. Few will deny that it is of the highest importance that nothing should be done to hinder technical and scientific development. The non-interference of the state in private affairs is one of our most cherished political principles. On the other hand, it cannot be denied that laws have a quickening influence on the spirit of a railroad director or manager, and whatever the general principles involved, a good deal of special legislation concerning railroads is sure to be had. The proper attitude of the American Society toward the subject would seem, therefore, to be to recognize this fact and to attempt to influence legislation for good. In every legislative body there is a certain number of men who are not entirely self-seeking, and it is pretty certain that these men are much more numerous than the newspapers would lead one to believe. Such men will wish to know and to do what is for public interest. They are the men who would be greatly influenced by an expression of opinion from one of the largest and most respected scientific bodies in the country. Mr. Goodwin's suggestion to interest all the civil engineering societies in the matter is a good one; that is, let the various engineering societies, by a joint committee of delegates, small in number but carefully chosen, formulate a scheme of inspection, and indicate such legislation as seems desirable in all matters of safety, so far as railroad structures and permanent way are concerned. The results of this committee's study if adopted by the societies would then become a guide for those legislators who wish to know and follow the opinion of experts. In many cases such men would either originate or modify legislation, and thus increase the chances of making it uniform, simple, temperate and workable, throughout the country.

What the legislation should be is a question to be settled by the consensus of expert opinion; and that the opinion not only of experts in construction, but of experts also in railroad operation and administration, and the forms and effects of laws. It may be said, however, that the simpler it is the better. Probably the best results all around would be obtained by provision for maintaining a record, always accessible to the public, of the actual condition of dangerous structures and points, such as bridges, crossings and junctions, and for fixing definitely the responsibility for the condition of such structures or points. It would not be necessary to provide for penal responsibility; publicity and definite responsibility would be sufficient. In case of accident or failure the responsible officer would be known and to him the loss of professional standing through publicity would be a serious punishment; to the company the pecuniary cost is always a punishment, somewhat in proportion to the magnitude of the crime. The Boston & Providence road, for instance, is not likely again to have a bridge

failure. The failure of retribution in that case is only in that, to this day, public opinion cannot be fixed upon some one individual as having failed in capacity or duty. By such a plan as is here briefly suggested no one would be hampered. The companies would be left free as they now are to use such designs and devices as they choose; and the ingenuity of individuals would be unrestricted. It would merely become impossible to begot the public mind and to hide blunders.

The recent conventions of the Master Car-Builders and Master Mechanics at Minneapolis and St. Paul have not only been productive of a good deal of work, but have enabled many railroad men to see a very interesting section of the country, which in many points of railroad practice presents an example which older portions of the country might follow. The extent to which suburban passenger traffic has been developed is perhaps without a parallel outside of Boston, and the absence of grade crossings and the use of union depots conveniently situated near the heart of each of the twin cities are points which might well be imitated elsewhere. There are approximately 80 passenger cars each way daily between Minneapolis and St. Paul. The trains are short, two passenger cars and a combination smoker and baggage car, and are run very punctually, the distance, about 10 miles, being covered in 25 minutes. On the two routes, which run 33 trains each, the Manitoba and the Milwaukee, the grades are heavy, 65 and 85 ft. per mile respectively. The third line, the Minneapolis & St. Louis, has better grades and will probably shortly become, in the hands of the leasing company, the Northern Pacific, a formidable competitor for the local passenger business. All the lines are more or less equipped with home and distant semaphore signals, and interlocking gear is used at junction points, etc. The tendency to abolish grade and highway crossings and use a proper system of signals is a very encouraging sign of the solid progress of the Northwest, and is further carried out in the substantial construction of the remarkably fine Union depot in Minneapolis and the Northern Pacific car shops at Como, nearly midway between St. Paul and Minneapolis. In the future, when these cities merge, the inhabitants will be provided with three excellent metropolitan lines, capable of conveying passenger trains of ample capacity at full speed, and free from the inconvenience of grade crossings and of elevated railroads running along the middle of the main streets. This fact cannot fail to have an important influence on the future of the twin cities.

The momentous decision of the executive committee of the Master Car-Builders' Association on the car coupler has been already referred to in these columns, and will, it is hoped, be confirmed by the results of the letter ballot and thus mark a definite step toward the general adoption of one type of safety coupler.

While the report of the brake committee was not final or conclusive, their researches have done much to elucidate a different problem and have spurred the competing brake companies to make great improvements in their apparatus. It has been pointed out, that just as we are arriving at the point where automatic couplers will be generally adopted, the use of continuous brakes will again oblige men to go between the cars to couple the hose and open the cocks. As this need not be done until the cars are actually coupled, the diminished danger is obvious.

The Master Mechanics have adopted almost the only standard that was open to them, that on the diameters of driving wheel centres and tires. As each railroad repairs its own locomotives, the incentive to use standard parts throughout is not so strong as in the case of cars. A large saving would, however, be effected, especially on roads of moderate size, were all the different makers to use interchangeable parts, so that parts of an engine built in Philadelphia would interchange with the corresponding parts of an apparently similar engine built at Paterson or Dunkirk. Small fractional differences, generally involving no improvement or even difference in general design, often prevent this interchange, which is so convenient in a repair shop. The larger roads can, of course, adopt their standard for every detail, and furnish makers with fully dimensioned drawings and gauges and templates of every part, but this course is not open to the smaller roads. As the new president of the Master Mechanics has been both a user and maker of locomotives, it may be expected that he will fully appreciate this point, and signalize his presidency by some effort to obtain standard parts, common to all makers.

Some changes of officers have as usual been made in both associations. Mr. Verbyck, who has been an ex-

cellent presiding officer and a worthy successor of the late Leander Garey, makes room for Mr. McWood, who possesses many special qualifications for the post. It is to be regretted that some little feeling was caused by a proposal to quicken the flow of promotion to the Executive Committee. All those who have followed the proceedings of the Master Car-Builders' Association are aware of the great services rendered by Mr. Blackall, which would not have been forgotten even if his place on the committee had been filled by a younger man. Unfortunately many considered that a slight was intended Mr. Blackall, and forgot that the younger members look forward to a place on the executive committee, and that the fact of having served for several years on that body is no mean honor. It was rumored, but it is to be hoped incorrectly, that the Secretary, Mr. M. N. Forney, will shortly retire. His services to the Association have been so signal and his qualifications for the post are so unique that his retirement would be a misfortune, even at a time when the Association is rapidly progressing in prosperity and influence and can point to much useful work accomplished. A thoroughly good secretary, possessed of energy, tact and discretion, has much to do with the success of an association composed of busy men who have little leisure to spare from the affairs of the great corporations they serve.

The Master Mechanics have also elected a new President, Mr. Jo hann, the senior Vice-President, and by the sad death of Mr. Woodcock the acting President, having declined the nomination as President. Mr. Setchel's election is a well deserved honor. He has served for many years as Secretary, and is one of the oldest members, and, by his experience and standing, is well fitted to be the head of the Association. The post of secretary requires the exercise of some literary ability and of much tact and impartiality, and will, we trust, be well filled by Mr. Sinclair.

The recent conventions were distinguished by the large attendance, which was somewhat remarkable, as St. Paul and Minneapolis are more remote from the centre of population than any previous meeting-place of either association.

HOW TO GET PROMOTED.

On another page will be found some interesting examples of the reports which the Louisville & Nashville road gets from its employes, and keeps on file at headquarters for reference in cases where vacancies necessitate promotion and the proper person has to be selected from a large number. A good understanding between a manager and any large body of men is a desideratum, and anything tending to produce such is worthy of note. Benevolence and justice both enter into the motives by which a superintendent (or the road through him) is actuated in his dealings with his subordinates, and it is always well that all reasonable methods be taken to have these matters well understood. Many officers are inclined to show the former trait before they do the latter; that is, to be so good and show so many favors (deserved favors, of course), that thoughts of injustice will not enter the minds of their men. Others in trying to acquire a good reputation among their men by always dealing justly with them are thwarted by the necessity of frequently making appointments of which the justice is not apparent to all, and also, unfortunately, many times by the favoritism which "circumstances" compel them to show. A "civil service" plan, fully explained, so that men can know some of the reasons why they are apparently overlooked and their envied fellows advanced, would remove the cause for much ill-feeling. If a man who seems to himself and to his associates fit for a certain promotion fails to receive it, the superintendent generally will be found to have more than one reason for "jumping" him; and it would be a material advantage to have a well understood standard of requirements so that the disappointed one could see (and be compelled to acknowledge) even one of the reasons; and as has been said before, the dissemination of information as to the nature of the requirements will aid powerfully in the attainment of the original object aimed at by Mr. Harahan and others like him, which is the maintenance of a large body of men who shall be constantly qualifying themselves for higher positions.

In cities and large towns there is little difficulty in finding men for such positions as this circular refers to; it is on roads extending through thinly settled territory that there is the most difficulty in getting good agents and cashiers. A road having lines under both these conditions can, of course, fill its "city" positions by applicants close at hand, and there is Scripture authority for telling the "country" agent that the reason for not advancing him is none of his business; but any one can see that enlightened self-interest would dictate a different policy; a substantial prospect

of a place in a more agreeable locality would raise the average grade of the men applying for the situations in lonesome and disagreeable places, and thus keep them filled more satisfactorily.

The facts shown in the reports it will be seen are largely preliminary, and in the nature of a mere index or reference. Nothing is said about moral characteristics, force of character and other important matters. These, it may be presumed, the general manager adds to his record from information gained through an under officer who knows, or from time to time as developed by circumstances. The chief points in the employe's own statement are under heads 10 and 11. In describing "fully" the duties of his present position an employe can really make a strong argument for himself, if he knows how, and provided his practice is not too far below his theory. In asking the men to recommend themselves for higher positions the "L. & N." has put a crucial test. A man in judging of himself has such a poor perspective that he finds it difficult to place things in their right relations. The Irish gravel-train hand when asked for his ideal aspiration thought that something "nice, clean and aisy" would be agreeable, and said that to be a bishop would about fill his mind; it is doubtful whether the average man can estimate his own level much better than this.

In this delicate task of blowing one's own horn it is not to be wondered at that all three of the men reporting failed. Caleb Parker shirked the question entirely; Ellis Mason did about the same; C. A. Johnson grappled with it, but was too diffident to say anything about a specific position, though he designated his choice of department clearly enough. All three of them evidently meant to tell what they *wished for*, though only the last-named did so explicitly, and he specified little except the size of the field he aspired to. This telling of wishes instead of stating facts seems to be the fundamental mistake made in these reports. "Put yourself in his place" is the motto that the men forgot to follow; instead of telling the manager what *they* wanted, they should have tried harder to get around to his side and convince him what *he* wanted. The first clause of question 11 is easily answered; but giving the reasons is where the pinch comes. Of course we here simply look at "the face of the returns;" possibly these men were so well known at headquarters that a mere reference only was necessary; but the point now before us is, how to make a strong statement on paper to take the place of personal knowledge. The transportation department is a trying one in which to define one's qualifications, and specially so for a station agent. He may wish for a larger station, but it is not by any means easy to state clearly the difference between the duties of large and small ones; or, if at a large one already, the great differences between his duties and those of any of the positions above him are so numerous that comparison is exceedingly difficult. The ideal way in which to set forth one's virtues is to have some one else do it; and these men naturally showed an inclination to have it that way; but, unfortunately, the circular will not admit of such treatment. Even if it would, a difficulty still would remain, for it is hard to find the right person for that kind of a task. A friend would state things too favorably, an enemy not enough so; an indifferent person would be worse than nothing. On moral and social points there is no use in dwelling, for it would do no good; to tell the superintendent that you moved in the best society, or that the patrons of the road were yearning for the chance to present you with a gold watch, might perhaps come within the bounds of truth, but the superintendent would prefer to seek information from some other source. To testify to your own character for honesty would raise the question as to who could guarantee the veracity of the testifier. But in purely business qualifications the aspirant should speak right to the point and cover all the points necessary, even if an additional sheet be required.

No man can see far into the future, and it must be remembered that practical men like superintendents are much more interested in what a man has *done* in the past than in the air-castles that he has *planned* for the future. Let the whole attention, then, be fixed on a clearly-expressed record. Mr. Johnson should state what he has learned about transportation, where he learned it, and how much digestion he has given to this knowledge; and the same in reference to the law department. He should tell what kind of railroad accounts he has had practice in, and how long, and refer to some recognized authority who can corroborate his assertion. His record as a stenographer should go into such particulars as the number of years' experience, the amount of experience, and the number of words per minute he can take; and perhaps impar-

tial justice would require him to state whether the proportion of letters he finds it necessary to write a second time (to correct errors) is 25 per cent. or 75. The term "liberal education" is very elastic and needs a deal of qualification; some people apply it only to a college course (and often dishonor the word even then). Mr. Johnson would do better to say just how much French or German he knows; give the practical extent to which his geometry or rhetoric helps him, and the actual range of his knowledge of law. He shows a disposition to strive after excellence, and is just right in so doing; but even here the cold logic of facts requires that he add some information as to the extent to which he has practiced "close application to business" heretofore.

Mr. Mason, in addition to full information as outlined above (so far as applicable) should state the nature of the requirements put upon him by the head of his department. If he expects his record to be extorted from the aforesaid head the least he could do would be to lay out a sketch or plan on which to do the questioning. A witness in court who wishes to make a favorable impression sees that the lawyer is primed with the right kind of questions. Surely there are prominent features in the "requirements" that are embodied in the experience of such a station agent with his immediate superiors during a series of years, and these he should lay stress upon.

Mr. Caleb Parker is the most independent of the lot; he seems to aspire to a general managership at the very least; and he should be able to give a very good account of himself. Even if he thinks the men at headquarters know him well enough already, he ought to practice on his biography, for the circular expressly states that the method of stating things is an element on which men are to be judged; and if Mr. Parker gets to be a general manager or even a division superintendent or train master, he will find that skill in expressing himself will be a valuable accomplishment.

In the caption of this article we have referred to *getting* promotion. The reader need not be told that promotion depends chiefly and primarily on the voluntary action of the giver and not upon the recipient, and that therefore anything like "getting" on the part of the one promoted has but a small part in the transaction. He can do what in him lies towards showing his fitness for higher responsibilities, but that is all. Of the things necessary to embody in a written account of evidence of fitness we have here touched upon only a few. And men who have made the very best kind of showing must bear in mind that success still depends upon numerous contingencies. They must remember that a superintendent of the very best motives will make errors of judgment in selecting men, especially where the choice lies between several of nearly equal qualifications. Personal qualities, as we have been told from childhood, have a bearing also. If the superintendent thinks you are not an agreeable companion he is not going to appoint you his head deputy or private secretary, however bright a business man you are. You must wait till he can give you a place where he thinks you will not offend people.

State Control in Sweden.

At the close of 1885 Sweden had 4,200 miles of railroad in operation. One-third belonged to the state; the other two-thirds were private, under the control of seventy different companies. The invested capital of the private lines amounted to \$69,000,000, of which \$26,000,000 was stock, and \$25,000,000 bonds. Most of these lines had received assistance from the state and from municipalities, in the way of subscriptions and guarantees of securities and interest. Altogether about \$10,000,000 had been received from the state and \$8,500,000 from municipalities. The gross receipts of the private lines for the year had been \$4,680,000, net receipts, \$2,264,000.

In this state of things the government was moved, by the persistent clamor about high rates, to an investigation. The management of the state lines was directed to report whether, in view of the bad condition of agriculture and other industries, a lowering of rates for grain and other bulky commodities might not be expedient. It was replied that nothing could be done without concerted action with the private lines. Letters were thereupon sent to the managements of the latter requesting expressions of opinion and proposals for methods of carrying out the reforms.

The responses were uncompromising. It was claimed that the private railroads had suffered fully as much as other industries in the depression. They could make no reduction unless it was going to profit them, and the question whether this result would follow must be left, in each case, to the judgment of the company concerned. It was intimated that the state, which had aided private lines to reach their extension, was under obligations to avoid measures disadvantageous to them. The state should not reduce rates on its lines in any case where traffic would be drawn away from private lines. The private lines had already met the demands of shippers in part, in having made agreements with the state lines in regard to part of the traffic. This had been done at no little

sacrifice, as the agreements were based on the lower rates of the state roads. Further concessions could not be made, and the existing arrangements must be ended if the state lines attempted any reform of rates.

It was clear that nothing was to be expected from the private roads. Meanwhile a learned commission of eleven had been appointed to devise measures of relief for the prevailing bad times. In November, 1886, it reported that relief could come only through the railroads. In reviewing the protest of the private lines against any lowering of rates by state roads, it was remarked that the agreements made with fifty-seven private lines and two Norwegian roads covered nearly half the traffic of the state roads (in 1885, 940,237 tons out of 2,169,380, or 43 per cent.) It was not tolerable that the state management should be hampered to this extent in attempts at reform. Further, the claims of the private lines should not have too much weight, as these reaped advantages, from the agreements in increased traffic, while charging higher rates on the traffic entirely under their control than did the state roads, and so receiving, in general, higher compensation for similar services. The reason why private companies could make no concessions, while the state management, with lower charges could, seemed to the commission to be this: The public roads have no interest save that of the country at large, and demand no greater return than shall give interest on cost of construction. The chief interest of the private roads is to gain the highest possible return on capital invested. Relying on this reasoning, and on an examination of continental railroad history, the commission gives its preference unreservedly to a state system. It considers that so long as the railroad possibilities of a country are undeveloped and lines widely separated, traffic will have a local character, and its regulation may well be left to local authorities. But so soon as a railroad system grows up, questions arise which concern the general interest of the state and must be left to state regulations if the general welfare is to be advanced.

Apart from the general advantages of state assumption of the roads in Sweden, such as the management of the whole system on uniform economic principles, the commission expects special advantages in the way of stability, uniformity, publicity of rates, and a doing away with rebates. A lowering of rates on the newly assumed roads is looked for at once, to conform them to those on existing state lines, after which a further general reduction may be expected, owing to the greater economy of management of one larger system, and the cheaper rates at which the state can borrow money. The hope is indulged that the change will ease the money market and relieve the communities which had subscribed to railroads, by releasing their capital. The commission concludes with a strong recommendation that means be provided by the state to buy up the private lines.

But one member of the commission dissented from this report, and he only on the ground of present expediency. The scheme, he thinks, will cost too much, and not fulfill all hopes of lower rates. It is not yet certain how far the Swedish government will be guided by this report. It has already made a reduction of 10 to 30 per cent. in the rates of the state roads for bulky freight.

The whole matter illustrates the tendency to look on railroads as a sort of financial Providence, able to heal all industrial diseases. Moreover, certain writers claim to find in it another proof that railroads can fulfill their proper mission only when the influence of the state upon them is as great as possible, that is, when they are completely in the hands of the state.

May Accidents.

Our record of train accidents in May, given in this number, includes 35 collisions, 43 derailments and 5 other accidents; a total of 83 accidents, in which 31 persons were killed and 73 injured.

These accidents are classified as follows:

COLLISIONS:				
Rear.....	18			
Butting.....	17			
DERAILMENTS:				
Broken bridge.....	3			
Broken wheel.....	1			
Broken axle.....	4			
Misplaced switch.....	2			
Landslide.....	2			
Accidental obstruction.....	5			
Miscellaneous.....	7			
Unexplained.....	19			
OTHER ACCIDENTS:				
.....	5			
Total number of accidents.....	83			
The causes of collisions were given were as follows:				
Trains breaking in two.....	4			
Misplaced switch.....	1			
Failure to put out signal.....	3			
Miscellaneous.....	4			
Unexplained.....	23			
Total.....	35			

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. e.
Defects of road.....	4	5	2	11	6
Defects of equipment.....	4	6	2	12	14
Negligence in operating.....	8	4	..	12	14
Unforeseen obstructions.....	..	8	3	11	13
Maliciously caused.....	..	1	..	1	..
Unexplained.....	23	19	..	42	52
Total.....	35	43	5	83	100
The number of trains involved is as follows:					
Passenger.....	16	12	2	30	28
Freight and other.....	43	33	3	79	72
Total.....	59	45	5	109	100
The casualties may be divided as follows:					
KILLED:					
Employees.....	6	7	3	16	51
Passengers.....	2	9	..	11	36
Trespassers.....	..	2	2	4	13
Total.....	8	18	5	31	100

INJURED:					
Employees.....	90	12	8	40	55
Passengers.....	8	21	..	29	40
Trespassers.....	2	2	..	4	5
Total.....	100	35	8	73	100

Eighteen accidents caused the death of one or more persons and 17 caused injury, but not death, leaving 48 (58 per cent. of the whole) which caused no personal injury.

The comparison with May, 1886, shows:

	1887.	1886.
Rear collisions.....	18	17
Butting.....	17	8
Derailments.....	43	58
Other accidents.....	5	8
Employees killed.....	16	17
Others.....	15	6
Employees injured.....	40	74
Others.....	33	96
Pass. trains involved.....	30	31

Average per day:		
Accidents.....	2.68	3.00
Killed.....	1.00	0.74
Injured.....	2.35	5.48

Average per accident:		
Killed.....	0.373	0.244
Injured.....	0.879	1.828

There is nothing specially remarkable about the month of May either this year or last. The activity of the spring and summer months is shown in the increase of accidents to, and caused by, work trains and other extras, and the facts forcibly illustrate the difficulty of running anything but regular trains without at once getting into trouble. But for the force of habit which governs so largely in the handling of regular trains we apparently should have collisions and other disasters much oftener even than we do. One accident in this list and two last year were to circus trains, in which it is common to carry passengers on what are really freight trains. This practice is, and always has been, dangerous, and there is still room for more care, it will be seen. One of the collisions of the month was at a railroad crossing, where an engine, whose rear cars had broken loose, innocently pulled up for the regular crossing stop and allowed the rear portion of the train to crash into him. The accounts do not state whether the crossing was occupied or not; but the question arises whether the engine should have gone across if it had been clear. At all events there can be no doubt that runners ought to look at their trains frequently, so as not to let it be said, as in this case, that "the breakaway was not discovered until the engine made the crossing stop;" many cases might arise where most men would much rather lay themselves liable to the legal penalty for violation of the law concerning stops than to risk lives and property by precipitating a collision; and with interlocking signals and a sensible law, crossing would in the majority of cases afford no excuse whatever for a collision of this kind. An accident similar to this occurred June 6.

The most serious accident of the month was that at Kitting Point. It is placed among the derailments, though it might with propriety be called a collision, or in fact be included under two or three different headings.

Coal Production.

Mr. Charles A. Ashburner has collected the statistics of the coal produced in this country in 1886 for the United States Geological Survey, and estimated its "spot" value. To the amount given about 8 per cent. should be added for consumption at the mines. The following table is made up from his return and the United States Geological report for 1885.

Coal Produced in the several states and territories, not including the local and colliery consumption, with the value at mines.

	1885.		1886.	
	Gross tons.	Value at mine.	Gross tons.	Value at mine.
Pennsylvania:	1=1000		1=1000	
Anthracite.....	32,265	\$72,274,544	32,795	\$71,558,126
Bituminous.....	23,214	24,700,000	23,358	21,016,335
Ohio.....	6,743	11,456,493	7,111	10,263,543
Iowa.....	6,988	8,206,988	7,531	7,013,450
West Virginia.....	3,584	4,819,230	3,851	5,391,151
Indiana.....	3,008	3,369,062	3,577	3,805,506
Maryland.....	2,121	2,731,250	2,079	3,450,000
Missouri.....	2,896	3,209,801	2,947	2,361,698
Alabama.....	2,750	3,850,000	1,607	2,340,000
Tennessee.....	2,225	2,990,000	1,608	2,574,000
Kentucky.....	893	1,100,000	1,530	1,971,494
Kansas.....	1,700	2,094,400	1,384	1,782,500
Colorado.....	1,082	1,410,438	1,250	1,680,000
Wyoming.....	1,211	3,051,580	1,221	3,215,584
Virginia.....	721	2,421,984	740	2,488,065
Indian Ter.....	567	666,792	611	684,951
Washington Ter.....	446	750,000	478	855,328
New Mexico.....	340	950,615	378	952,931
Georgia.....	271	918,606	242	813,855
Utah.....	134	180,000	200	334,500
Arkansas.....	180	436,000	178	420,000
California.....	134	225,000	111	260,000
Texas.....	134	300,000	80	300,000
Montana.....	134	300,000	80	185,000
Oregon.....	135	45,178	54	90,651
Dakota.....	77	307,540	46	174,460
Idaho.....	45	125,000	40	112,500
	23	91,000	21	41,377
	1	4,603	1	6,000

The production of coal in this country, the United Kingdom, Germany, France, Belgium, Russia and Austria from 1866 is given by Mr. J. S. Jeans in his last report to the Iron Trade Association, from which we take the output of this country, England and the total:

	United States.	United Kingdom.	Total.
1 = 1,000.	1 = 1,000.	1 = 1,000.	
1866.....	21,856	111,442	133,245
1867.....	25,505	104,309	129,814
1868.....	28,258	102,948	131,206
1869.....	28,368	107,506	135,874
1870.....	35,498	109,035	144,533
1871.....	41,384	107,284	148,668
1872.....	45,416	123,492	168,908
1873.....	51,004	127,011	178,015
1874.....	46,916	124,937	171,853
1875.....	46,896	131,861	178,757
1876.....	47,500	133,470	180,970
1877.....	49,000	134,610	183,610
1878.....	52,700	132,607	185,307
1879.....	52,200	134,008	186,208
1880.....	70,100	146,818	216,918
1881.....	76,200	141,184	217,384
1882.....	86,848	156,490	243,338
1883.....	96,874	168,737	265,611
1884.....	99,142	180,757	279,899
1885.....	96,831	150,351	247,182
1886.....	96,145	157,418	253,563

This shows that while the principal coal producing countries of the world have increased their output from 1866 to 1884 by 183 million tons, or 100 per cent., England has increased hers by 49 million tons, or 44 per cent., and we have increased ours by 77 million tons, or 353 per cent. Russia, however, shows an increase from 390,000 to 3,950,000 tons, or at the rate of 913 per cent.

In 1866 we were producing about 12 per cent. of the total, against England's 61 per cent.; while in 1884 we raised 27 per cent. of the total, against 43 per cent. raised in the United Kingdom.

The extent to which English-speaking people serve the world is shown by the fact that we mine 70 per cent. of the coal, and make 63 per cent. of the pig iron, 64 per cent. of the Bessemer steel and 51 per cent. of the manufactured iron of those countries whose statistics are collected.

Under the caption "Our Great Competitor," James Keith, in the last number of the *Nineteenth Century*, calls the attention of the English public to points of superiority in our position over theirs. In some instances he considers us more fortunate than we ourselves do, saying that "Americans pay no imperial taxation whatever, the whole Government and Civil Service expenditure being paid out of the import duties," apparently not knowing that our receipts for internal revenue have for the past three years averaged \$116.9 million against \$189.5 million for import duties. Here it is not necessary to go to Congress for power to make local improvements as there, nor are our telegraphs in the hands of the Government preventing the application of telephony to private business, "unless through companies heavily handicapped by the Government." In agriculture and resources generally, we are placed at the front, the question being asked, "How is it possible that our farmers can continue to pay heavy rates, in many cases under unjust restrictions, and compete with the American farmers, who, under more favorable climatic conditions, practically sit next you?" In food, the cheapness of the actual cost of living in this country is admitted, and though clothing, luxuries and labor are dearer here than in England, "still the average American workman lives 100 per cent. better than the average workman does in Great Britain, because he has higher wages and cheaper food in greater variety."

Attention is called not only to their disadvantages resulting from the general higher cost of distributing goods, but it is said "our governing powers seem to agree with our great railway companies that our competitors from the outside ought to have the preference. To give a single case: goods can actually be sent from New York to London, via Liverpool or Glasgow, at a less cost for freight and carriage than we, the British people, can send similar goods by the same rail from Liverpool or Glasgow to London, or vice versa." As steamers run from this country to all three of the ports mentioned, every one will see that the steamship owners will contend they should not be charged full rates on the traffic they bring to the roads leaving Glasgow and Liverpool, as no goods will go over those lines unless there is either superior speed or cheaper transportation. The statement of Mr. Keith that the cost of carriage from New York to London is less than from Liverpool to London may seem to present an anomaly calling for the interference of the Board of Trade, but it is no more remarkable than that the freight on tea from China to San Francisco is often, if not generally, 1 to 1½ cents higher than from China to New York via San Francisco, the through rates to New York being governed by tramp steamer rates through the Suez canal, the lack of return freights from San Francisco to China preventing their competition to that city. The article closes with a demand that the people wake up, "while the American Republic thunders past with the rush of the express" and see that the disadvantages under which the nation labours are removed.

A "General Literary Agent" would be a valuable officer on a railroad; and, according to the *Troy Times*, which invented this title, there is one on the Fitchburg road. Many time-tables of new roads, and of old as well, bear indications that the person who gave the names to some of the stations not only lacked literary counsel, but failed to get even the aid of a spelling book or an old newspaper. To call a place "Newport News & Mississippi Valley Junction," simply because the traffic with the road of that name constitutes the chief business at the station, when a short name like Rex or Grim can be readily found in the dictionary indicates laziness; and "Three-hundred-and-eighty-five-mile-siding" as a name for a meeting place which may some time be a town is a deliberate rebuff to possible settlers. So long as Lucy, and Bliss, and Killarney, and St. Ola, Machynlleth and a thousand others are in the directory and can be had for the borrowing no place should lack for a name, and a short, distinctive one.

Chairman Midgely, of the Pacific Coast Association, has given notice that the Pacific coast east and west-bound tariffs, including the agreement with the Trunk lines, which were to expire by limitation July 7, will be continued until further notice. These tariffs were made under the permission given by the National Commission's temporary suspension of the fourth clause of the Inter-state law. This temporary suspension having now expired, it appears that the transcontinental roads are acting on the assumption, as outlined in the recent decision of the Commission, that the Pacific coast business is of such a nature that they are justified in disregarding the fourth clause.

The Wabash railway is accused of cutting passenger rates between Chicago and St. Louis by selling tickets in large lots and then taking back those not used; so that a party of two

could buy, say, 50 and put in a "claim" for the refunding of the money paid for 48. Of course, there always may be circumstances in which the redemption of a ticket that a person has bought and not used, is justifiable; but the systematic practice of anything of the kind justly exposes those doing it to the accusation of allowing rebates, whatever name it may be called by.

The Union Pacific seems to be possessed of a settled determination to show the Central Pacific as little favor as possible, the establishment of a freight line to San Francisco via the Oregon Short Line and steamers from Portland indicating that every available means will be taken to divert business from the Central. The failure to establish through Pullman car service between Omaha and San Francisco, which was promised a year or two ago, also indicates that there is "no love lost" at Ogden.

At Stratford, Conn., the other day a locomotive lawfully standing on the track of its owner at a highway crossing was run into by a peddler's team, and the flagstaff broken off. The boot is generally on the other foot, but if the peddler has a liberal contingent fund on hand, it would only be following a well-established precedent for the railroad company to sue him for \$500.

Grain shipments from Chicago are now so plenty that the boats readily get 4% cents per bushel for corn and 5% for wheat to Buffalo, but canal rates from Buffalo are now at the lowest point thus far reached this season, 3% to 3% cents for wheat to New York.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

Cape Fear & Yadkin Valley, in North Carolina, 6 miles since last reported.

Fort Worth & Denver City, northward from Quanah, Tex., 85 miles, 21 miles since last reported.

St. Louis, Arkansas & Texas, Sherman branch, from Mount Vernon, Tex., Westward, 80 miles since last reported.

This is a total of 107 miles for the week, making 1,982 miles reported thus far for the current year. The new track reported to the corresponding date for 16 years has been:

Miles.	Miles.	Miles.	Miles.	Miles.
1887.....1,982	1883.....2,391	1879.....1,035	1875.....457	
1886.....1,580	1882.....4,758	1878.....791	1874.....727	
1885.....1,119	1881.....2,418	1877.....710	1873.....1,587	
1884.....1,416	1880.....2,228	1876.....846	1872.....2,937	

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

English Railroads—Their Administration, and the Status and Duties of Executive Officers.

V.

The General Manager on most English lines is more of a final Court of Appeal in disputed questions than an active administrative officer. The small amount of routine work which passes through his office is shown by the small number of clerks employed there, varying from 4 to 12, except in one or two cases where the management is more centralized than on the majority of other lines.

The Goods Manager is considered as probably the hardest worked officer on the road, and his salary is little below that of the General Manager and Solicitor.

It must be borne in mind that there are no express companies and no freight lines in England, properly so-called, and the Goods Manager has consequently to do their work. There are, of course, large firms of carting agents who collect and deliver merchandise for transport in the various towns, on payment of a commission of so much per ton by the railroad companies who employ them for the terminal service. But the Goods Manager undertakes to convey goods, say, from the door of a cotton factory in Lancashire to a dry goods warehouse in a narrow London lane, or side street, in one night, or say 200 miles in 15 hours, including cartage. This means no delays, and, in fact, space is too valuable in England to allow of the enormous storage space for cars so common in America.

One of the principal duties of the Goods Manager is to make rates, and speaking generally, as we have said before, they are made on the basis of what the traffic will bear, having regard to the special circumstances of each case. Apart from opinions as to the merits or demerits of the system, it undoubtedly makes the quotation of rates a most intricate business, and the fact that traders have a tribunal to appeal to if they think they are discriminated against, does not make the Goods Manager's duties any lighter. The maximum rates were supposed to be fixed by the various acts of Parliament under which the construction of the roads was authorized, but it is now doubtful whether these rates included terminal expenses or were a payment for haulage only. As the interest on the cost of some freight stations, principally caused by the high price of land in large cities, alone amounts to 5 shillings per ton, or 5% c. per 100 lbs., terminal expenses are a very important item on the short hauls common in England. While the staff of the Goods Manager load and unload the trains, they have nothing to do with their running, all the conductors, brakemen, signal men and switchmen being under the Traffic Superintendent.

The station agents or station masters and their staff are also responsible to the Traffic Superintendent for everything relating to passenger traffic and the movement of trains; but they report all receipts, claims, etc., as regards freight to the Goods Manager. The traffic department, governed by the superintendent, includes, in short, the conduct of the

whole movement of the trains and the collection and delivery of freight between the starting and ending stations. It collects at stations all moneys, in the first instance, obtained for the transport of passengers and merchandise. On some roads of moderate size, the General Manager is also the Traffic Manager.

The Superintendent of the Locomotive Department has on many lines the complete control of the locomotives and the repairs of the carriages and wagons (passenger and freight cars). The passenger cars are cleaned and lighted by the traffic department. But on some important roads the carriage and wagon construction and repairs have been, during recent years, placed under a separate superintendent.

The engineers' department includes the repair and maintenance of the permanent way, and of all bridges, tunnels and buildings, and in most cases of the gas and water supplies. The hydraulic cranes and hoists, used very extensively in the larger goods stations or freight yards, are generally maintained by the locomotive department. The signals are generally purchased from manufacturers, but are always maintained and repaired by the engineers' department.

The engine drivers, who are primarily under the control of the Locomotive Superintendent, are bound as far as lies in their power to obey the instructions of the traffic department as to the movement of their trains, but the engine driver is allowed a certain amount of discretion. For instance, he can decline to take a load he deems too heavy for his engine.

In the event of any dispute or accident the guard can report the driver to the Traffic Superintendent, and the latter forwards the report to the Locomotive Superintendent. If either officer is not content with the written statements of the affair, but wishes to hear the verbal account of both sides, a "joint inquiry" is held. For instance a train gets off at a switch. The different men concerned make the following contradictory statements as to the cause:

1st. The engine flanges were worn square and forced upon the point rail.

2d. The engine went too fast and got to the switch before it could be properly opened.

3d. The switch was thrown, but not held properly.

4th. The switch was in bad shape and could not be operated properly.

As these allegations affect the driver, the switch tender (pointsmen) and the surfacemen, all belonging to different departments, each department sends an officer to conduct the joint inquiry. The men are brought in one by one and questioned to find where the blame really rests. If it is clear that the driver was to blame, he is punished as the Locomotive Superintendent thinks fit. But should the latter consider his man blameless, the other officers cannot interfere, though they may have a very decided opinion of their own. A serious or disputed affair of the kind may, however, be brought before the General Manager, whose decision is final.

The Locomotive Superintendent has generally charge of all the pumping engines on the line, the oiling of the cars, and of the hulls and machinery of the steamboats which some of the large English railroad companies possess. Turn-tables, water columns and gas works are, in some cases, under the engineer, and in some cases under the Locomotive Superintendent.

The Locomotive Superintendent has very generally two or more principal assistants, one of whom looks after the "running" or out-door department, which comprises all the men engaged in working the engines and effecting small repairs. This includes drivers, firemen, cleaners, coal men and the mechanics who do small repairs. This assistant is often a promoted runner. The principal duties of the post are to keep down the coal and oil consumption; inquire into all petty accidents and misdemeanors; pick out the best men for promotion, and see that each round-house has a sufficient supply of suitable engines. He is consulted by the Traffic Superintendent before any alteration is made in the time table, so that the trains may be worked without requiring an undue number of engines.

It may be mentioned here that in England the movement of every train and every light engine is entered in the printed book called the "working time table," which is supplied to every employé concerned in the movement of trains. This book generally contains a great deal of useful information concerning the gradients, signals, orders in which the freight cars in different freight trains should be marshaled, etc., etc. In order to prevent confusion this time table is altered as seldom as possible, and then only from the first day of a month or quarter. Efforts have been made to have only three time tables in the year—each of four months' duration, commencing on the 1st of November with the first book. This would save an immensity of printing if nothing else.

The other or second principal assistant to the Locomotive Superintendent has charge of the shops, and superintends the construction of new locomotives and all important repairs to old ones, and where there is not a separate superintendent of the carriage and wagon department he has charge of the repairs and construction of cars also.

The Storekeeper is another general officer. Though, like the General Manager and Secretary, he has usually but a small and not overpaid staff, yet his office is one of great importance, as the whole of the supplies, or stores, for the line are purchased by him, and issued by him as required. He has often, however, but little real power of independent action, every important contract for stores being sharply supervised by such of his directors as are commercial men. Sometimes the Storekeeper is a subordinate of the Locomotive Superintendent; and the most difficult and complex part of the Storekeeper's work is in purchasing stores for the locomotives and passenger cars. The traffic department seldom requires many stores beyond tarpaulins to cover the wagons (freight cars), oil for burning, brushes and brooms for cleaning and

sweeping carriages, platforms, etc., and a supply of desks, tables and chairs for the waiting rooms.

Some companies do all their own printing, make all their own lamps and lanterns and mix and prepare all their own oils. Others roll all their own steel rails, make all their own switches and frogs, besides their own signal telegraph work. Some make their own iron roofs and bridges, also make both common bricks and firebricks.

Attempts have been made to legally interdict some companies from constructing locomotives and cars, but the courts have upheld them, but limited the power to provide engines, etc., for their own lines, or lines which they work, but not to construct and afterwards sell rolling stock to foreign or independent lines.

The Storekeeper is saved a deal of work where the companies are extensive manufacturers of their own plant or supplies. Few men can be equally able to judge of the quality and detect adulterations in articles so varied as Low-Moor iron, white lead, rape oil, lead pencils, paints, tool steel, timber, curled horse hair, superfine blue cloth, car trimmings, chairs, and five hundred other things, from tallow to tin tacks. Yet all these things afford wide scope for the ingenuity of the dishonest contractor to a company.

Train Accidents in May.

COLLISIONS.

REAR.

4th, a. m., on Pennsylvania Railroad, near Plainsborough, N. J., a freight ran into a preceding freight just going on a siding and badly wrecked a number of cars, injuring 2 brakemen fatally and another seriously.

4th, p. m., on Lehigh Valley road, near Waverly, Pa., a freight train ran into preceding freight, damaging several cars.

5th, night, on Pittsburgh & Western, near Carbon, O., a freight ran into preceding freight, damaging engine and 12 cars.

9th, a. m., on Chicago, Burlington & Northern, near Lynxville, Wis., a freight ran into a preceding freight, slightly damaging the engine, caboose and several cars.

10th, night, on Lehigh Valley road, near Stockton, Pa., a passenger train running at high speed ran into some coal cars which had been pushed out of a siding by boys. The engine was upset and wrecked, fatally injuring the fireman.

11th, a. m., on Philadelphia & Reading, at Lansdale, Pa., a passenger train ran into a preceding freight, just going into a siding, damaging the engine, caboose and several cars.

11th, night, on Southern Pacific, near San Pedro, Cal., a freight train ran into some freight cars which had been left standing without attendance on the main track. Locomotive damaged and 3 cars wrecked.

14th, early, on Baltimore & Ohio, in Tiffin, O., a switching engine collided with a circus car, doing some damage and injuring a circus man.

14th, a. m., on Union Pacific, near Red Rock, Mont., a freight train broke in two while descending a grade, and the rear section ran into forward one, wrecking 5 cars and injuring 2 tramps who were stealing a ride.

14th, p. m., on Milford, Franklin & Providence, near Franklin, Mass., a freight ran over a misplaced switch and collided with some freight cars standing on a siding, damaging the engine and several cars.

22d, p. m., on Baltimore & Ohio, at Bay View, Md., a freight car making a flying switch was thrown on the wrong track, running into and damaging a car occupied by telegraph linemen, killing 1, injuring another fatally and 2 others seriously.

25th, night, on Cincinnati, Hamilton & Dayton, near Lima, O., a freight train broke in two and rear portion ran into forward one with great force, doing considerable damage.

25th, night, on Missouri Pacific, near Scott, Mo., a freight train broke in two, and rear section ran into forward one, wrecking 8 cars.

27th, noon, on New York, Pennsylvania & Ohio, near Mansfield, O., a freight ran into a preceding freight which had been ditched, doing some damage.

Before a flag could be sent out, a closely following freight dashed into the first mentioned train, throwing 7 cars over an embankment.

29th, on Pennsylvania Railroad, near Irwin, Pa., a freight broke in two, and rear section ran into forward one wrecking 10 cars.

29th, night, on Baltimore & Ohio, near Dillon Falls, O., a freight ran into rear of a stalled excursion train, doing some damage.

31st, early, on Cleveland, Columbus, Cincinnati & Indianapolis, near Osborn, O., a passenger train ran into some freight cars, which had been left on the main track, injuring the engineer.

BUTTING.

4th, on Chicago, Rock Island & Pacific, near Centerville, Mo., a butting collision between a freight and a construction train wrecked both engines and 10 cars. One laborer of the construction train was killed and 3 others badly injured.

4th, p. m., near West Point, N. Y., a butting collision between a New York, Ontario & Western passenger train and a West Shore construction train damaged both engines and several cars and injured 2 laborers. The accident is attributed to the negligence of flagman of the construction train.

6th, on Delaware & Hudson Canal Co.'s road, near Port Henry, N. Y., a butting collision between a freight and construction train damaged both engines and derailed several cars.

6th, p. m., on New Brunswick road, at Frederickton Junction, N. B., a switching freight ran into a passenger train, damaging a baggage car.

8th, p. m., on Cleveland, Lorain & Wheeling, near Massillon, O., a butting collision between a freight and a gravel train badly wrecked both engines and a number of cars.

10th, night, on Pennsylvania Railroad, in Philadelphia, a butting collision between two freights wrecked both engines and 4 cars and injured an engineer.

11th, p. m., on Valley Railway, near Akron, O., a butting collision between a special passenger train and a construction train on a curve damaged both locomotives.

13th, night, on Mobile & Ohio, near Waynesboro, Miss., a butting collision between a passenger train and a light engine demolished both engines, killed a fireman and injured 3 other trainmen.

16th, night, on Pennsylvania Railroad, near Tennent, N. J., a butting collision between two passenger trains damaged both locomotives and 4 cars, and injured 2 trainmen and 5 passengers.

19th, a. m., on Philadelphia & Reading, near Mahanoy Plane, Pa., a passenger train ran into a switching freight just going into a siding and damaged 2 engines.

20th, early, a butting collision between a Nashville, Chatta-

nooga & St. Louis passenger train and an Alabama & Great Southern freight, near Lookout, Tenn., wrecked both engines and several cars. Cause, negligence of flagman.

22d, p. m., on Delaware & Hudson Canal Co.'s road, at Osborn Hollow, N. Y., a butting collision between a passenger train and a gravel train injured 1 trainman and several laborers.

23d, a. m., on Wabash, St. Louis & Pacific, near Monclova, O., a butting collision between two freights wrecked both engines and 20 cars. Thirty barrels of oil in one of the cars exploded and fired the wreck, which was consumed. A brakeman was caught in the wreck and fatally burned.

28th, early, on New York, Lake Erie & Western, at Greycourt, N. Y., a butting collision between a passenger and a freight damaged both engines badly.

28th, on Chicago, Burlington & Northern, near Savanna, Ill., a butting collision between two passenger trains damaged both engines and several cars.

30th, p. m., on Chicago & West Michigan, near Benton Harbor, Mich., a butting collision between a freight and a construction train wrecked both engines and several cars, injuring an engineer.

31st, night, on Philadelphia & Reading, at Carbon Run Junction, Pa., a butting collision between a passenger and a freight wrecked both engines and several cars, and injured 2 trainmen seriously.

DERAILMENTS.

BROKEN BRIDGE.

5th, night, on Atlantic & Pacific, near Daggett, Cal., a passenger train, behind time and running at high speed, went through a bridge which had been partially burned. The engine crossed safely, the violent jar, however, throwing the fireman out of the cab; but the tender fell into the shallow stream, forming a barricade, against which the cars ran with great force. The mail, baggage, express and 2 passenger cars were thrown in various directions and badly wrecked. Fireman seriously and 2 trainmen and 4 passengers more or less severely injured.

24th, on St. Louis, Arkansas & Texas, near Wabbaseca, Ark., several loaded stock cars broke through a trestle and were wrecked, killing 14 head of cattle.

27th, p. m., on St. Johnsbury & Lake Champlain, near Hardwick Village, Vt., the tender and 5 cars of a freight train went through a culvert which had been clogged and weakened by heavy rains. Engineer and fireman killed, conductor seriously injured.

BROKEN WHEEL.

6th, on St. Paul, Minneapolis & Manitoba, near Grafton, Dak., several cars of a freight were derailed by a broken wheel.

BROKEN AXLE.

8th, p. m., on New York Central & Hudson River, in Rochester, N. Y., a car in passenger train was derailed by a broken journal.

19th, p. m., on Florida Railway and Navigation Co.'s road, near Lake City, Fla., several cars of freight were derailed by a broken journal and wrecked.

22d, night, New York, Lake Erie & Western, at Turner's, N. Y., several cars of freight derailed by broken axle.

28th, evening, on Pennsylvania Railroad, near Kittanning Point, Pa., as a passenger train and a freight were passing on opposite tracks, a car in the freight was derailed by a broken axle and hurled against 2 cars of the passenger train. The cars were badly damaged, 8 passengers killed or fatally injured and 6 others hurt.

MISPLACED SWITCH.

11th, a. m., on New York, Lake Erie & Western, at Ridge-wood Junction, N. J., a freight derailed by misplaced switch.

26th, p. m., on St. Paul, Minneapolis & Manitoba, near Minot, Dak., the engine and 9 cars of a freight were derailed by a misplaced switch and wrecked, killing the engineer and a brakeman.

LANDSLIDE.

6th, night, on Fitchburg road, near Millers Falls, Mass., a freight ran into a landslide and the engine and 25 cars were ditched and piled up in a bad wreck. A brakeman went down with the wreck and was killed.

27th, very early, on Delaware & Hudson Canal Co.'s road, near Addison Junction, N. Y., a passenger train ran into a land-slide, throwing 4 cars into Lake Champlain. Two trainmen injured.

ACCIDENTAL OBSTRUCTION.

2d, evening, on Philadelphia & Reading, near Phoenixville, Pa., engine of passenger train was derailed in a tunnel by a large boulder which had broken loose and fallen on the track. The engine ran along the ties for some distance, when it struck the guard-rail of the bridge over the Schuylkill River, which prevented a more serious accident.

7th, noon, on New York, Lake Erie & Western, at Turners, N. Y., 10 cars of freight were thrown from the track and demolished by a brake-beam which had fallen on the track.

14th, night, on Buffalo, Rochester & Pittsburgh, near 3 cottsville, N. Y., the end of a loaded coke car fell out and on to the track, derailling a large portion of the train and piling up 8 cars in a bad wreck.

24th, on Boston, Hoosac Tunnel & Western, near Eagle Bridge, N. Y., several cars of a freight train were derailed by a drawhead which had dropped on the track. Conductor injured.

25th, early, on New York, Lake Erie & Western, near Allendale, N. J., 9 loaded cars of freight were wrecked by the dropping of a brake-beam.

MISCELLANEOUS.

4th, early, on the Baltimore & Ohio, at Gainesville, Md., 4 cars of passenger train were thrown from the track by a defective switch and badly damaged, slightly injuring several passengers.

4th, on Cleveland, Columbus, Cincinnati & Indianapolis, at Greencastle, Ind., in attempting to make a flying switch, an engine and 2 coal cars were derailed and wrecked, and a trainman injured.

8th, a. m., on Louisville, New Albany & Chicago, near Greencastle, Ind., a passenger train was derailed by a switch which had been purposely misplaced. The engine went over an embankment, killing the engineer.

18th, early, on Atchison, Topeka & Santa Fe, near Pueblo, Col., a passenger train ran into a herd of cattle, ditching the engine, mail and express cars. Three tramps were stealing a ride. One of them was killed and the other two were slightly injured.

21st, p. m., on Pittsburgh, Cincinnati & St. Louis, near Goes, O., an engine of freight was derailed and damaged by a broken truck.

22d, p. m., on Florida Railway & Navigation Co.'s road, near Jacksonville, Fla., engine of freight derailed by a defective frog.

22d, very early, on Pittsburgh, Cincinnati & St. Louis, in Pittsburgh, Pa., some cars of freight being pushed onto a spur track were not stopped soon enough and jumped the track, doing considerable damage to a tenement house adjoining.

UNEXPLAINED.

1st, early, on Pennsylvania Railroad, near Gap Station, Pa., 10 cars of freight were derailed and considerably damaged.

2d, early, on Atlantic & Pacific, near Coolidge, N. M., a

passenger train was derailed and wrecked, injuring several passengers.

6th, early, on Buffalo, New York & Philadelphia, at Son-yea, N. Y., 7 cars of freight jumped the track and were wrecked.

6th, early, on New York Central & Hudson River, near Lockport, N. Y., 4 cars of freight were derailed and damaged, tearing up the track considerably for some distance. The derailed cars passed over a bridge 125 ft. high.

9th, p. m., on Cincinnati Southern, in Lexington, Ky., a switching engine was derailed and badly wrecked.

10th, a. m., on Buffalo, New York & Philadelphia, at Mt. Morris, N. Y., a freight was derailed and badly wrecked, blocking the track for some time.

13th, p. m., on New York, Lake Erie & Western, in Bing-hampton, N. Y., several cars of freight derailed.

13th, night, on West Jersey road, near Pine Grove, N. J., several cars of freight train were derailed.

18th, p. m., on Dayton & Ironton, near Harbines, O., several cars of freight were derailed and wrecked.

19th, early, on Denver & Rio Grande, near Salida, Col., a sleeping car of passenger train was derailed and wrecked, killing 1 passenger and injuring 2 others.

23d, on Missouri Pacific, near Muscotah, Kan., a freight was thrown from the track and wrecked, seriously injuring the fireman.

24th, p. m., on New York Central & Hudson River, at Woodlawn, N. Y., a car in a passenger train was derailed while being backed off, and blocked both main tracks for several hours.

25th, a. m., on Atchison, Topeka & Santa Fe, a freight was derailed near Wichita, Kan.

26th, on Houston & Texas Central, near Waxahachie, Tex., an engine and several cars of a freight were derailed and thrown over an embankment, making a bad wreck. Engineer seriously injured.

27th, noon, on New York, Pennsylvania & Ohio, near Mansfield, O., several cars of freight derailed and ditched.

28th, on Lake Shore & Michigan Southern, near Allegan, Mich., the engine of a freight train derailed, killing the engineer and seriously injuring the fireman.

28th, on St. Louis, Iron Mountain & Southern, at Iron-dale, Mo., the rear car of a passenger train jumped the track and collided with a box car standing on a siding, injuring several passengers.

29th, on Toledo, Columbus & Southern, near Findlay, O., several cars of a freight train were derailed and wrecked. A tramp stealing a ride was killed.

29th, evening, on Central of Georgia, near Smarr's, Ga., a freight train was derailed and blocked the train for some time.

OTHER ACCIDENTS.

3d, very early, on New York, New Haven & Hartford, in New Haven, Conn., engine leaving roundhouse exploded its boiler and was completely wrecked, damaging the building and 2 other locomotives near by. The engineer, fireman and several other employees were injured. The explosion is attributed to low water in the boiler.

4th, night, on Intercolonial Railway, near Trois Pistoles, Que., a huge mass of ice and earth fell upon a passenger train, consisting of 2 engines and 4 cars, wrecking it completely, killing the fireman and one brakeman.

4th, night, on St. Louis, Iron Mountain & Southern, near Cliff Cave, Mo., the engine and 6 cars of a freight were buried out of sight by a landslide. Two tramps who were stealing a ride in one of the cars were killed.

7th, a. m., on Canadian Pacific, near Port Moody, B. C., a large boulder fell and struck the rear car of a construction train, killing a laborer and slightly injuring several others.

19th, early, on Delaware & Hudson Canal Co.'s road, near Peckville, Pa., an engine of passenger train broke a parallel-rod, and the loose end damaged the cab considerably.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

An important decision on the matter of an exclusive franchise has been rendered in Nebraska. In 1887, the Omaha Horse Railway Co. was given by a charter the exclusive right for fifty years to operate a "horse railroad" in the city of Omaha. In 1884, the Cable Tramway Co. was organized and given the right by the city to lay and operate a cable road in the streets. The old company asked an injunction to restrain the cable company, contending that its exclusive grant covered a cable railroad, or any kind of a street railroad. But the Federal Court refuses the injunction, holding first that constraining the monopoly as all grants of monopolies should be construed, strictly, "horse railroad" does not mean "street railroad," and second, that in any event, an exclusive grant of a right to do anything includes only the right to do it as it was done when the grant was made, and not after discovered methods of doing it. Hence, cable roads being unknown when the grant was made, were not included in it.

The more insignificant the court, the greedier it is of jurisdiction. The Supreme Court of Washington territory—more powerful apparently than the Court of Appeals of New York—decides that, even without any legislative authority, it has the right to compel a railroad to extend to the public proper depot facilities for the transaction of business. Takima City was a flourishing town, the county seat, and the largest and only important place in the county; a railroad stopped its trains there, but afterward changed its policy and ran all its trains through, without stopping, to a point four miles beyond, where there were only a few houses, and speculators were attempting to build up a town as a rival to Takima City. The Territorial Court orders the railroad to establish a depot and stop its trains at Takima City.

In 1869, the legislature of Arkansas passed a law providing that lands donated to railroad companies "shall not be listed nor subject to taxation until conveyed to actual purchasers." The Supreme Court has just decided that this law is unconstitutional.

In the United States Circuit Court in Louisiana, a pooling and traffic arrangement made by the Receivers of the Texas Pacific Railway Co. with the Missouri Pacific Railway Co., which has 200 miles of road parallel to it in Texas, and giving the Missouri Pacific a preference in rates, was ordered by Judge Pardee to be abrogated upon objection made by other lines connecting with the Texas & Pacific Railway Co.'s road in Louisiana, although the Receivers are willing to make the same arrangements with the objecting companies, if they will furnish their road with the same amount of business under the same conditions, and although the arrangement is satisfactory to the traffic agents of the objecting companies, and operates to the benefit of the property in the Receivers' hands. The Judge also holds that membership in a traffic association is improper, and the Receivers will be ordered to withdraw therefrom, if the association has power to make discriminating rates for or against the Texas & Pacific Railway Co.

A system of railroads covered by general mortgages as well as local underlying mortgages, was placed in the hands of receivers by the mortgagor. Subsequently proceedings were instituted to foreclose the general mortgages, and the foreclosure suits and the original suits were consolidated, and the Receivers were continued in possession, and administered

the whole system for the benefit of all parties in interest. The holders of bonds secured by underlying mortgages were represented by their trustees, and a decree foreclosing the general mortgages, and ordering a sale, was entered without objection. The entire property was sold pursuant to the decree, and the purchasers agreed to pay all preferred debts before receiving possession, and the contract of sale was partially executed. The United States Circuit Court in Missouri has just decided that it was too late, after such decree and sale, for holders of underlying mortgage bonds to object to the manner in which the earnings of the system had been applied prior to the decree, and to proceedings to foreclose their mortgages, and too late for the Court to so alter the decree as to change the rights of the purchasers. The Court also rules that preferred debts for work done and materials furnished, incurred in the operation of a division of a system of railroads owned and operated by a single corporation, are a lien upon all the lines of the system, prior in right to both local and general mortgages. The mere fact that some of the lines of such a system have been paying and others not does not justify a casting of the entire burden of the preferred debt upon the latter. Where such a system of roads is covered by general mortgages, and some of its branches by local underlying mortgages, and the entire system is placed in the hands of receivers in proceedings to foreclose the general mortgages, the earnings of the system should, as a rule, be apportioned among the different divisions for payment of taxes and interest on underlying mortgages upon a mileage basis. The ordinary rules of business should be observed, however, and a larger proportion of the earnings may properly be expended upon one division than upon others, in case it is necessary to the prosperity of the system as a whole.

The Chicago & Iowa Railroad Co., having executed certain mortgage bonds payable in 30 years, made a traffic contract with another railroad by which it was agreed that the latter road should retain complainant's share of the earnings under the contract, and pay them over semi-annually to a trustee, to be applied to the redemption of the bonds, the contract to continue in force for 30 years, "or for so long a time as will be sufficient to provide a fund large enough to redeem all of said bonds." This agreement was indorsed on the bonds. The United States Circuit Court at New York holds in an action between the complainant railroad and the bondholders, that this agreement did not give the railroad the right to pay off the bonds as soon as a fund sufficient for that purpose had accrued, and without waiting for the expiration of the 30 years, when the bonds were to mature.

Carriage of Goods and Injuries to Property.

In Arkansas it is held that the damages a shipper may recover for delay in delivering goods at their destination is simply the difference between their value when delivered and when they should have been delivered, with interest, unless the carrier has been informed that a specially advantageous sale has been made of the goods provided they are delivered at a certain time.

The Supreme Court of Errors of Connecticut decides that the statute of that state which gives a railroad company an insurable interest in property along its line, and permits any person injured to recover from the company damages for any injury done to "a building or other property" by fire communicated by a locomotive engine is constitutional. This statute, it is to be observed, makes a railroad absolutely liable for damage by fire, whether negligent or not. The company may insure the property if it can, but if it is not able to obtain insurance it is not released from liability. The Court also holds that the words "a building or other property" in the statute include growing trees, fences and herbage.

In Texas, land was overflowed by water from a river, the culverts of the railroad company not being large enough to carry it off. The owner sued for damages. The Supreme Court holds that if the overflow was of such an extraordinary character that railroad engineers of ordinary care and prudence in the construction of the embankment and culvert could not reasonably be expected to have anticipated and provided against it, then the railroad company was not liable; but if, although the overflow was extraordinary, it might reasonably have been anticipated and provided against, the railroad was liable. And it appearing that there had been in three former years—1833, 1843 and 1852—similar overflows, the railroad had sufficient notice, and is held responsible in damages.

In the Federal Court in Colorado, it is decided that although a railroad company may have acquired the right to lay a track along a street, and run its trains thereon, yet, if it leaves its cars standing on the track so as to improperly obstruct travel, the abutting lot owners may recover for such improper use of the street, and the cause of action for such injuries arises as often and whenever they occur; and for each day's continuance of the wrong a new cause of action arises. But it is not an improper use of the street to run trains at night as well as during the day, to run heavy freight trains, and to ring bells and sound whistles.

In Michigan it is held that when proceedings are had to condemn lands for railways, all the damages that the owner may sustain by reason of the construction and operation of the road are allowed; and subsequent damage to a water power by reason of the completion of a railroad bridge in a manner that is common and proper, if not absolutely necessary, cannot be recovered in a suit against the company. In Indiana the Supreme Court holds that the statute giving railroads power to cross highways without paying compensation therefor does not include gravel roads built and maintained by private companies. In Illinois it is decided that where, as the result of the building and operation of a railroad, the property of an adjacent property owner is damaged, the entire cause of action, not only for present, but future damages, accrued to the person who owned the property at the time the road was constructed and placed in operation, and the vendee of such owner cannot recover. In the same state, the Supreme Court rules that proceedings for condemnation of land for railroad purposes may be dismissed by petitioner at any time before rights become vested in the land owner, the company having the right to abandon one route and select another.

Injuries to Passengers, Employees and Strangers.

A highly important decision on the duty of railroads in the building and maintaining of bridges comes from Iowa. A train was derailed near a bridge which spanned a ravine, and running upon the bridge broke through and several passengers were killed. In a suit by the executors of one of them, the duty of a railroad in the construction of its road, track, bridges and rolling stock was much discussed. The trial court told the jury that the degree of care which a railroad was required by law to exercise was that adopted by the most carefully and skillfully managed railroads in the country. This view is approved by the Supreme Court. Yet this is a rather curious test, for it amounts to this, that if the best railroads are negligently run, any others have only to imitate them to be free from all liability. The Supreme Court also approved of another instruction, that the railroad "was not required to so construct its bridges that it would resist an unusual and extraordinary shock of a derailed train, running at regular speed and striking it with great force." The railroad company won the case. The views of the Court on the general question of the duties of

the railroad may be best seen in the following extract from its opinion:

"The defendant was bound to exercise the highest degree of care and diligence which was reasonably consistent with the practical operation of its railroad, and the conducting of its business, and this is right. It is doubtless true that precautions could be used in the construction and operation of railroads that would prevent many of the accidents which occur as they are constructed and operated. It sometimes happens that a derailed train is precipitated from a high embankment, and the lives of its passengers endangered or destroyed. Accidents of that character could be avoided by constructing all railroad embankments of such width that a derailed train or car would come to a stop before reaching the declivity. But this would add immensely to the cost of constructing such improvements, and, if required, would in many cases prevent their construction entirely. If passenger trains were run at the rate of 10 miles per hour, instead of from 25 to 40 miles, it is probable that all danger of derailment would be avoided. But railroad companies could not reasonably be required to adopt that rate of speed. Their roads are constructed with a view to rapid transit, and the traveling public would not tolerate the running of trains at that low speed. When it is said that they are held to the highest degree of care and diligence for the safety of their passengers, it is not meant that they are required to use every possible precaution, for that, in many instances, would defeat the very objects of their employment. There are certain dangers that are necessarily incident to that mode of travel, and these the passenger assumes when he elects to adopt it. But all that is meant is that they should use the highest degree of care that is reasonably consistent with the practical conduct of the business."¹⁰

- ¹ Omaha Horse R. Co. v. Cable Tramway Co., 30 Fed. Rep. 324.
- ² See Notes of Decisions of Railroad Law in the Gazette of April 29, 1887.
- ³ Northern Pac. R. Co. vs. Territory, 13 Pac. Rep., 604.
- ⁴ Files v. State & Fochontas R. Co., 3 S. W. Rep., 617.
- ⁵ Mo. Pac. R. Co. v. Texas & Pac. R. Co., 30 Fed. Rep., 2.
- ⁶ Central Trust Co. v. Wabash, St. L. & P. R. Co., 30 Fed. Rep., 339.
- ⁷ Chicago & Iowa R. Co. v. Pyne, 30 Fed. Rep., 86.
- ⁸ St. L. & S. R. Co. v. Blufford, 3 S. W. Rep., 514.
- ⁹ Grissell v. Houston R. Co., 4 New Eng. Rep., 85.
- ¹⁰ Gulf, C. & S. F. R. Co. v. Pomeroy, 3 S. W. Rep., 722.
- ¹¹ Frankie v. Jackson, 30 Fed. Rep., 398.
- ¹² Barnes v. Michigan Air Line R. Co., 32 N. W. Rep., 466.
- ¹³ Indianapolis & Road Co. v. Belt R. Co., 8 West. Rep., 544.
- ¹⁴ Chicago & East Ill. R. Co. v. McAuley, 8 West. Rep., 457.
- ¹⁵ Chicago, St. L. & West. R. Co. v. Gates, 8 West. Rep., 705.
- ¹⁶ Pershing v. C., B. & Q. R. Co., 32 N. W. Rep., 488.

THE SCRAP HEAP.

He Likes to Hustle.

Mr. C. W. Smith, First Vice-President of the Atchison, Topeka & Santa Fe Railroad, is, according to the Chicago Mail, a man of iron nerve. When traveling the engineer has never been known to pull his car too fast. When on the Chesapeake & Ohio, of which he was general manager for several years, he had a "pet" engineer. No other man on the line could pilot him over the road just to his satisfaction. Over the Allegheny & Blue Ridge Mountains they would fairly fly—through tunnels and cuts and over hills they would sail at a rate of speed often reaching sixty miles an hour. He has been in almost a countless number of accidents during his thirty odd years of railroad life, but has never received a scratch. Another one of his freaks is his fancy for the number 99. That is the number of his private car and is presumably his "Mascot" number. He never had a car with any other number but it failed to give satisfaction. At one time, it is said, when the 99 was in the shops undergoing repairs, he ventured out on the line in a car of another number, but it was smashed into splinters before it had got 200 miles from home.

Trying to Muzzle the Mosquitos.

An uncomfortable man has written to the New Orleans Picayune, complaining of the negligence of the railroad monopolists in Louisiana for not supplying mosquito nets to sleeping car passengers. This seems unreasonable in face of the fact that the ultra-perfect Pennsylvania Railroad contributes no such luxury on its line between Jersey City and Philadelphia. And what is a Louisiana mosquito to the world-renowned Jersey product? Do New Orleans mosquitoes wear roller skates? Do they use the Rand or the Ingersoll Rock Drill? They don't, eh? Well then!

Settlers and the Land Grant Railroads.

Commissioner Sparks has reported to the Secretary of the Interior the case of W. M. Mattacks, a settler in Kansas on land within the indemnity limits of the Missouri, Kansas & Texas Railroad, who settled in 1866, before the railroad withdrawal was made, but who was prevented from putting his claim on record in the local Land Office by erroneous advice of the Register of the United States Land Office, who was at the same time an official of the railroad company. When he subsequently applied to enter he was told that the lands were withdrawn for the railroad. In 1873 the tract occupied by Mattacks was patented to the railroad company; but he remained on the land, and is there yet, having made it his home with his family for more than twenty years, during which time it has become a farm worth \$2,500. The railroad company attempted to oust him by proceedings in the District Court of the state, but the Court decided in favor of the settler, whereupon the railroad company appealed to the Supreme Court of the state. The settler then applied to the Department of the Interior for relief from the persecutions of the railroad company, stating that he was unable to defend his claim through all the courts. Commissioner Sparks recommends to the Secretary that suit be at once brought to set aside the railroad patent, and that the United States Attorney be instructed through the Department of Justice to appear in the state Supreme Court and advise the Court of such action, and to take such steps and file such motions as may be necessary to protect the settler's home.

Though this case is exceptional in many respects, yet the proposed intervention of the Government on the settler's behalf in court is a novelty; and if the course recommended by the Commissioner is adopted, similar intervention may be asked in a great number of cases.

Away from the Small Boy's Cannon.

The exodus of people from New York City Saturday by train and steamer amounted to about 180,000, and of these fully 80,000 went out to spend the Fourth out of town. The New York, New Haven & Hartford road dispatched 85 cars on Boston trains, and moved in all 25,000 people.

The Race is Not Always to the Wealthy.

Even John L. Sullivan knows better than to tackle a refractory car window when he is traveling. And yet we have seen little feeble dudes attempt it, just to please a pretty girl.—Somerville Journal. Yes, and after this little Somerville dude has yanked himself wholly out of plumb, barked his knuckles and snapped off the keystone button of his rousers, the porter, who has been watching the proceedings

with a very tired expression of countenance, comes forward and runs the window up with the simple pressure of the forefinger of his left hand. And the pretty girl sighs as she goes to wondering which is the more valuable adjunct of masculinity—a diamond scarf-pin or one ounce of technical skill.

Texas Refuse to be Robbed this week.

FORT WORTH, Texas, July 6.—An attempt was made about 8:30 o'clock this morning to rob the through Kansas City express on the Santa Fe Railway between Pendleton and Temple. The telegraph operator at Pendleton suspected that something was wrong from the strange action of eight men around the station. He wired the train dispatcher at Temple just in time to stop the express train. An armed posse was speedily organized and the train proceeded northward. Half way between Pendleton and Temple the train was flagged and an obstruction was noticed on the track. No sooner had the train stopped than six men attempted to board the engine and cars. The posse opened fire on them. One of the robbers fell and the others fled. The wounded man was carried off by his companions into a dense thicket near by, leaving a trail of blood behind. Officers are still out hunting for the robbers, with the chances in favor of their being captured.

TECHNICAL.

The Car Shops.

The Bradley Car Works, Worcester, Mass., are building 100 coal cars for the Providence & Worcester road.

Bridge Notes.

Colonel J. M. Wilson, Lieutenant-Colonel Peter C. Hains, and Major G. J. Lydecker, a Board of Engineer Officers who have been considering the subject of a bridge across the foot of Pennsylvania avenue, Washington, D. C., have made a report to the Secretary of War approving Lieutenant-Colonel Hains' report to the Chief of Engineers on the bridge question, and recommending that plans and prices on a bridge shall be advertised for.

The St. Johns & Halifax and St. Augustine & Palatka Railway managers, together with those of the Jacksonville, Tampa & Key West, have decided to bridge the St. Johns river at Palatka, Fla.

The Penn Bridge Works, of Beaver Falls, Pa., have been awarded the contract for erecting the new railroad bridge on the Pittsburgh, Fort Wayne & Chicago over the Beaver River at that point. It will be a double track, four-span, pin-connected truss structure, and must be completed in four months.

Manufacturing and Business.

The Union Indurated Fibre Co., of Lockport, N. Y., is building a dry house 140 x 40 ft., capable of holding about 2,000 dozen pails in the process of drying. It is also building a large addition to the treatment house, 150 x 50, two stories high, of stone, with iron roof and floor, and is just completing a boiler house with two new boilers.

The Curtis Regulator Co., Boston, report May sales as follows: To Whittier Machine Co., Boston, steam and pump regulators 2½ to 4 in.; Walworth Manufacturing Co., Boston, several steam traps, Nos. 1 to 4, and pressure regulators; Martin's Car Heating Co., ten regulators for locomotives; Porter Steam Heating Co., Minneapolis, regulators for steam blowers; New York, several return traps, Nos. 1 to 3, Edwards traps No. 3 and regulators; Chicago, No. 3 duplex return traps, etc.

Edward Cliff has severed his connection with the Cliff & Righter Co., and will again represent the Richard Vose National Car Spring Co., of New York.

The New Jersey & New York Railroad is putting the McKee coupler on its new freight cars and will also substitute them for the common draw-bars on the old cars.

The Mason Regulator Co., Boston, Mass., has received orders from several large roads for the special reducing valve which they are manufacturing for use on the various systems of car heating by steam.

The Wainwright Manufacturing Co., Boston, Mass., report shipments of their corrugated tube exhaust feed-water heaters to the following places during the month of June: 4 to Boston, 2 to New York City, 1 each to East Buffalo, N. Y.; Whitman and North Adams, Mass.; Cumberland Mills, Dexter and Bar Harbor, Me.; St. Joseph, Mo.; Decatur, Ill., and Weimar, Texas. They are booking orders for these heaters very rapidly, and note one from the largest iron manufacturers of Western Pennsylvania for 2 of 1,000 horse-power each.

The National Railway & Street Rolling Stock Co., of Concord, N. H., has established an office at Boston for the purpose of introducing their dust guard, axle bearings and other railroad specialties. The company claims to have a dust guard which is giving perfect satisfaction on several large roads in the United States, and is in possession of valuable testimonials from leading railroad officials. The officers of the company are: Thomas Gogin, President; James M. Stone, Treasurer and Attorney, and M. V. B. Stimson, Agent.

The Servis Railroad Tie-plate Co., of Canada, at Moncton, N. B., are applying for incorporation, with \$100,000 capital, the object being to manufacture the Servis railroad tie-plate. Messrs. J. L. Harris and C. P. Harris, of Moncton, and Perry C. Woodworth, of Kentville, N. S., are largely interested in the enterprise.

Iron and Steel.

The Pennsylvania Steel Co., at Steelton, Pa., made during the month of June (25 working days), 1,005 frogs, 722 switches and 553 switch stands, besides a large number of magneto crossing signals.

Messrs. Tarrant & Ramsey, Chicago foundrymen, have just completed two large cylinder castings, 40 in. in diameter, 54-stroke, weighing about 8 tons each, for E. P. Allis & Co., of Milwaukee. They are said to be the largest cylinder castings ever made in Chicago.

The managing directors and owners of the Moss Bay Hematite Iron and Steel Co., of Workington, England, manufacturers of the well known brand "Moss Bay" pig iron, steel rails and general merchant iron, with auxiliary bolt, nut, spike and rivet works, are projecting the duplication of their extensive works and manufactures in Washington territory. Mr. Peter Kirk, active practical manager and partner, who visited Pittsburgh last summer in the interests of his firm, has lately been laboriously engaged in perfecting arrangements for an early commencement of operations, erecting blast furnaces, iron and steel mills, opening mines and mineral royalties and building workmen's houses. It is believed that several advantageous purchases have been concluded for this purpose.

Work has begun on the buildings in which the Johnstown, Pa., Steel and Iron Casting Co. will carry on operations at Sheridan, two miles west of Johnstown. The main building will be of frame 142 x 50 feet. The company will make a specialty of steel castings.

The Clinch Valley Coal and Iron Co. will start a mining town at Richlands, in Southwest Virginia. They will soon begin opening mines.

The Illinois Iron and Bolt Co., of Carpentersville, Ill., are putting up a new building 58 x 128 ft. in size, and one story high, for a forge shop, and are getting new machinery for it.

The Hoeflinghoff & Lane Foundry Company, of Cincinnati, capital stock \$150,000, has been incorporated in Ohio.

A syndicate composed of Milwaukee and Chicago capitalists, of whom Hustis, Coughlan & Ray are the representatives, recently purchased a tract of 200 acres of mineral land in the township of South Crosby, Leeds County, Ontario. They have been doing some prospecting, and some samples of ore were received in Chicago this week, and the company at once received an order for 1,000 tons at \$6 per ton from a Chicago steel company.—*Milwaukee Miner and Manufacturer.*

The Rail Market.

Steel Rails.—The only transaction reported is the sale of 8,000 tons by an Eastern mill. Quotations, \$38@39.50 at Eastern mill, according to time of delivery, etc.

Old Rails.—There are a number of orders in the market from Western consumers. As yet none of these orders have been placed, the only transaction reported being the purchase, on speculation, of a 500-ton lot of doubles, afloat at New York. Sellers ask \$23@23.50 for tees and \$24@25 for double heads.

Rail Fastenings.—Spikes are quoted 2.40@2.50c. net; angle fish-bars, 2.10@2.25c.; steel angle bars, \$2.20@2.30; bolts and nuts, 3@3.20c.; bolts and hexagon nuts, 3.20@3.30c.

Petroleum Fuel.

A petroleum furnace is being constructed for the Britton Iron and Steel Works, in Cleveland, and the Cleveland Rolling Mill is making experiments in the same direction. An official in the Standard Oil Co.'s works, in that city, is reported as saying that oil will soon supersede all other fuel in heating boilers and stills in their establishment.

A Western telegram says: "The oil producers of the Lima, Findlay and North Baltimore fields, in Ohio, have signed an agreement with the Standard Oil Co. to cease production for nine months, in order to give the Standard Co. a chance to find a market for Ohio's crude oil as fuel. This action is the result of a meeting of the producers to consider means of increasing the price of crude oil."

The Situation in the Coke Regions.

The superintendents at all the works throughout the Connellsville region gave notice on Tuesday last that work would be resumed on July 6 at wages paid before the present strike, and that old employees would be given the preference. About 150 Pinkerton officers have been engaged to afford protection from the strikers to those wishing to return to work.

Block Signals.

The Boston & Maine road is using the Gould-Tisdale system of electric semaphore block signals between Boston and Old Orchard, Me. It is said to have given entire satisfaction.

The Cowell Coupler.

Some tests of the Cowell automatic freight car coupler have just been concluded on the Union Pacific, and are claimed to have satisfactorily established the durability, efficiency and practicability of that device.

An Electric Motor Experiment in Philadelphia.

An interesting exhibition of a street car propelled by electricity from storage batteries placed under the seats was given last week by William Wharton, Jr., & Co., in Philadelphia. The car used was an ordinary horse car. The batteries were manufactured by the Electrical Accumulator Co., of New York, and consist of 84 small cells, each being of the size of about one quarter of a cubic foot. The track upon which the car is run is 1,000 ft. in length, with four curves, one of which has a radius of 33 ft. Immediately upon leaving this curve a gradient commences with a rise of 264 ft. per mile. The exhibition was eminently satisfactory in all respects.

The Bentley-Knight System on Fulton Street.

Ground has been broken for the cross-town electric street railroad in New York City from Fulton ferry through Fulton street to West street, and on the latter as far as the Chambers street ferry, and it is said that the expectation now is to have cars running on the route within 60 days. The road will be operated by the Bentley-Knight motor. The current will be carried underground by a system identical with that in use at the Rhode Island Locomotive Works in Providence. Some mention of this project was made in Mr. Martin's paper on electrical railroads, published in the *Railroad Gazette*, April 29, 1887, in which it was stated that the system has been specially worked out with a view to use in large cities, and was first demonstrated on a road in Cleveland. The conduit to be used is 13½ in. deep and 25½ in. wide, and the contact plows are so devised that they can be pulled clean out of the slots at a second's notice. The same company is building a line for the Observatory Hill Passenger Railway Co., in Allegheny City, Pa.

Railroad Building by Military Engineers.

A movement, which promises to become important, will be begun in Germany this year. A regiment of engineers, now stationed in Berlin, is to construct a private railway line in Mecklenburg, joining Wismar and Carow by way of Sternberg. Bruel & Goldberg, the contractors for the line, have concluded an arrangement according to which the whole work will be executed at the ordinary price. Operations will begin at once, and the road will be finished by autumn.

Steel Rails for Japan.

The Japanese Government has recently placed some large orders for steel rails in Europe; half the contract has gone to English firms at £4 11s., the other half has been taken by Germans, not at £4 11s., but at £5 6s. The rails are to be delivered free on board in London and Antwerp respectively. The difference of 15s. per ton represents in this case, says a writer in *Iron*, a free gift of about £10,000 presented by the Japanese Government to the German manufacturers.—*St. James's Gazette.*

Rails for China.

Of the 12,000 tons of rails for which the Chinese authorities were inquiring, a contract for 4,500 tons was let early this week for the Formosa line.—*The (London) Engineer.*

The Julien System on Fourth Avenue.

The Julien Electric Co. has recently been running experimental cars, actuated by storage batteries, over the Fourth avenue surface road in New York City. They have several times run a car over the whole length of the line, from the station at Thirty-second street down to the City Hall, up to Eighty-ninth street, and then back to Thirty-second street. In a recent experiment they ran with a speed at certain times of over 12 miles an hour, and the run from the station to the City Hall was made in 19 minutes, as against 32 minutes for the horse cars. Subsequently the car was again run over the route for Mr. Cornelius Vanderbilt and some of the officers of the Fourth avenue road. It was sent through the tunnel, from Thirty-second street to the Grand Central Depot, at a speed of 15 miles an hour, and was then worked through the switches and curves about the depot. The experiment, so far as the operation of the car goes, seems to have been very encouraging, as the starts and stops were made with precision and ease, and the car ran steadily at any speed tried. The president of the company says that he will guarantee that the cars can be

run at a cost not to exceed \$4.10 a day each, running 90 miles, with full loads. A Julien car is now running in St. Louis and others are building for other roads. It is said that the John Stephenson Company is now building a Julien car for Boston.

Bridge Across the Willamette River in Oregon.

The Oregon Railway & Navigation Co.'s bridge at Portland, Oregon, over the Willamette River, will be 660 ft. long, including a draw span of 340 ft. The west end of the draw will be at the Portland wharf line, and, if occasion requires, ships may drop through, holding to the wharf all the time. There will be but two piers in the stream—the pivot pier and cylindrical columns supporting the eastern span. The foundation for the pivot pier will consist of piles driven down to bedrock, and on these a grillage of solid timber. The masonry will begin about 6 ft. below low water mark. The other pier will consist of two wrought-iron columns, 14 ft. in diameter. At the east end there will be a stone abutment, and at the west end, within the wharf line, cylindrical columns. The superstructure will be almost entirely of steel, manufactured by the Union Bridge Co., of Buffalo, N. Y. It will be 20 ft. wide. The overhead road for teams will be 22 ft. above the railway track, and at each side there will be walks for foot passengers.

Canal Contracts Awarded.

The contracts for lengthening the locks on the Erie Canal have been awarded as follows: Lock No. 32 to Soule & Raynor for \$23,991.50; Lock No. 33 to Soule & Raynor for \$26,200; Lock No. 31 to Clinton Beckwith for \$21,079; Lock No. 46 to Paas & Ford for \$15,117; Lock No. 62 to B. P. Smith for \$26,509; Lock No. 44 to Daniel Ford for \$28,114; Lock No. 45 to John Moor for \$28,408; Lock No. 53 to John Moor for \$22,276; Lock No. 55 to John Moor for \$34,986; Lock No. 56 to John Moor for \$28,502; Lock No. 57 to Hughes Brothers for \$25,895; Lock No. 60 to Hughes Brothers for \$25,895; Lock No. 61 to Hughes Brothers for \$26,175. The appropriation for this work was \$375,000, and the total amount of the bids is \$331,089. The bids for Lock Nos. 34 and 35 were thrown out because there was but one bid on each. Both were by Soule & Raynor, that for No. 34 being for \$25,503, and for No. 35 for \$24,242. With these sums added to the total, with \$19,000 deducted for material from the State, there was still remaining of the appropriation \$13,000. The appropriation for Lock No. 72, on which no bids were received, was separate from the others, and is \$29,000.

Proposals for enlarging Locks Nos. 34, 35 and 75, Erie Canal, together with two for Champlain Canal, will be invited by advertisement.

The Sewall Car Heater.

The Sewall Safety Car Heater Co. has completed its negotiations with the Chilean Government for the use of its system of car heating on the railroads of that country. It is also reported that the Intercolonial of Canada has contracted with the Sewall Co. for the equipment of a train on that road during the coming winter, that the system may be given a thorough trial before the adoption of any of the systems of steam heating. The Grand Trunk will also run a train the coming winter fitted up with the Sewall system.

New Steel Car.

Messrs. W. W. Green and James Murison, of Chicago, have patented a steel fire proof and accident proof railway passenger car. It is claimed that this car will weigh one-third less and cost much less to build than the ordinary wooden car, and that any kind of railway car can be built at the same proportionate weight and cost. The car will be completely fire proof, having not a particle of wood or any combustible substance in it. The inside will be finished with galvanized iron or asbestos pulp, the outside with corrugated steel, the whole painted, finished and decorated as finely as any car, and when on the track will present an appearance very little different from the ordinary passenger car.

The spiral or flange of the car will be of steel three inches wide and one-fourth inch thick, and the tension steel rods running from end to end of the car through the frame will be 1½ in. diameter, which will be increased in hollow pipes fastened to each spiral.

To deaden the sound and prevent any vibration, the space between the floor and under part, and the entire space between the inside and outside of the car will be filled with mineral wool. The steel floor will be covered with heavy asbestos cloth, over which can be placed linoleum or anything desired.

German Competition in the Steel Rail Trade.

It has transpired that some large orders for rails have recently been placed by the Japanese government simultaneously in England, with Messrs. Cammell & Co., at £4 11s. per ton f. o. b. London, and in Germany (chiefly, we believe, with the Union Company, of Dortmund) at 25 Gs. f. o. b. Antwerp. We have heard a good deal lately about German competition in the iron and steel and other trades; but there is no question of competition here. It is simply a gift by the Japanese government to the German manufacturers, for which, it is hoped, the former obtain a quid pro quo of some kind or other, or expect to get it. English manufacturers only ask for a fair field and no favor, and do not fear the failure of their ability to hold their own in equal competition; but if individuals or governments choose, for reasons of their own, to make a present of, say, in this case, about £100,000 to our German rivals, they are, of course, at liberty to do as they like with their own, but British manufacturers cannot be blamed for failing to secure business in face of favoritism. A conviction is fast spreading abroad that the Japanese Government and people are so fickle in their friendship, and so unreliable in their commercial dealings, that they are not worth taking the trouble to please; and that in the neighboring empire of China is to found the field which is eminently worth cultivating.—Iron.

Reproducing Drawings.

The "blue print" method of reproducing drawings has the advantage of being easily, quickly and cheaply done; but as the lines are white and the ground blue it cannot be colored or altered, and is difficult to trace or decipher in the shops. It has therefore been almost entirely superseded in Europe by the Pellett process, a French invention, which gives blue lines on a white ground. This, in turn, is being supplanted by a "black process," which gives black lines, resembling common writing ink, upon a white or slightly violet ground. These prints can be colored and additions or alterations made in red ink, and much resemble an ordinary drawing. This process, the invention of Mr. Poitevin, is technically known as "heliography," and is described as follows in the *Photocolor*:

Sensitizing Solution.—Dissolve separately:
1. Gum arabic 13 drams.
Water 17 oz.
2. Tartaric acid 13 drams.
Water 6 oz. 6 drams.
3. Persulphate of iron 8 drams.
Water 6 oz. 6 drams.

The third solution is poured into the second, well agitated, and then these two solutions united are added to the first, continually stirring. When the mixture is complete, add

slowly, still stirring, 100cc. (3 fl. oz. 3 drams) of liquid acid perchloride of iron at 45 deg. Beaumé. Filter into a bottle and keep away from the light. It keeps well for a very long time.

Sensitizing the Paper.—The paper should be very strong, well-sized and as little porous as possible. By means of a large brush or sponge apply the sensitizing liquid very equally in very thin and smooth coats; then dry as rapidly as possible with heat, without exceeding, however, a temperature of 55° C. (131° F.). The paper should dry in obscurity, and be kept away from light and dampness; notwithstanding all these precautions it does not keep well long, and if it is desired to act with some certainty it is better to have a stock to last only a fortnight. Freshly prepared it is better than a few days afterward. It should be of a yellow color.

Printing.—The tracing, made with very black ink, is placed in the printing frame, the drawing in direct contact with the plate; then place over it the sensitized paper, the prepared side in contact with the back of the tracing. There is no necessity to make use of photometric bands as the progress of insolation is sufficiently seen on the sensitized paper during the exposure. The paper should change from yellow to white in the clear portions, where there is no drawing of the transfer or positive to be copied. This can be ascertained by raising from time to time the shutter of the frame. The exposure lasts from ten to twelve minutes in the sun; in summer less, in winter more. When the exposure is ended remove the print from the frame, and it should show a yellow drawing upon a white ground. If in the sensitizing bath a few cubic centimetres of a rather highly concentrated solution of sulphocyanide of potassium have been added, this bath becomes blood-red and colors the paper the same; in this case the print also whitens during exposure, but then the image, instead of being yellow, is red on a white ground. This substance, however, is inert or without any other action; and is very fugitive, and even disappears in a short time in obscurity; it has no other use, therefore, than to render the drawing or the image more visible after exposure.

Developing the Prints.—When the print has been sufficiently exposed it is taken from the pressure-frame and floated for a minute in the following solution, so that the side upon which is the image should alone be in contact with the surface of the liquid, avoiding air bubbles between the two surfaces. Otherwise defects would be found in the print; to ascertain this, raise in succession the four corners. The developing bath is composed as follows:

Gallie acid (or tannin)	31-48 grs.
Oralic acid	14 grs.
Water	34 oz.

In this bath the orange, yellow or red lines are changed into gallate or tannate of iron, and form consequently a permanent black writing ink. The print is then plunged into ordinary water, well rinsed, dried, and the print is finished. The violet-black lines become darker in drying, but unfortunately the ground, which appears of a pure white, often acquires in drying a light violet tint. For some prints this is of no importance; but in others it is objectionable. By this process a drawing in black lines is obtained similar to the original, and in most cases this is sufficient.

Compressed Gas.

Mr. Robert M. Dixon, Engineer of the Pintsch Lighting Company, issues the following circular letter: "Among the general press dispatches a few days since, there appeared a statement that at the recent railroad accident at Potsdam, Germany, the fire that ensued was caused by an explosion of gas. As the only system of car-lighting by gas in Europe is the Pintsch system, of which this company is the representative in the United States, and as it has been demonstrated, both theoretically and experimentally, that nothing of this kind is possible under this system, we immediately cabled the Messrs. Pintsch, at Berlin, for an explanation. In reply, we received the following cablegram:

BERLIN, June 23, 1887.

"Newspaper reports are not true. Burning of cars not caused by illuminating gas, but by the coal fire of the overturned locomotive. The gas tanks of the cars remained intact. Investigating Commissions of the Royal Prussian Railways have proved by tests that our oil gas cannot burn cars even when the tanks are broken and it escapes and burns."

"Although the Pintsch gas system has been adopted by more than one hundred companies, and is in use on some 25,000 cars, there has never been one solitary instance of injury from the gas. It has been recently stated that the cost of lighting railway cars by electricity is no greater than lighting by gas; whereas, the fact is, the cost of electrical lighting, as shown by its own promoters, is several hundred per cent. more than the cost of our system, as shown by actual use. The cost of lighting by this system is less than by oil lamps as used."

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Duluth, South Shore & Atlantic.—Annual meeting, at the office, Marquette, Mich. July 21.

Marquette, Houghton & Ontonagon. annual meeting, at the office, Marquette, Mich., July 21.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern. 1½ per cent., semi-annual.

Michigan Central. 2 per cent., payable Aug. 15.

New York Central & Hudson River. 1 per cent., quarterly.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Western Society of Engineers holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The American Institute of Mining Engineers. forty-ninth meeting, Duluth, Minn., July 26.

Southern Railway & Steamship Association. annual convention, Hygeia Hotel, Old Point Comfort, Va., July 13.

The National Association of General Passenger Agents. at St. Paul, Minn., Sept. 20.

The National Railroad Agents' Association holds its annual meeting in Minneapolis, Minn., July 10.

The National Association of General Baggage Agents. Denver, Col., July 20.

The Association of Railway Telegraph Superintendents holds its annual meeting in Boston on July 13.

The Master Car and Locomotive Painters' Association. New York, Sept. 14.

Roadmasters' Association.

The Roadmasters' Association of America will be convened at the Kennard House, Cleveland, O., for three days' session, Oct. 11, 12 and 13. The committee appointed to prepare a programme of questions for discussion has submitted the following: 1st. Unfinished business; 2d. Standard guard

rails for frogs; 3d. Standard frogs; 4th. Standard guard rails for bridges and re-railing safety frogs and bridges; 5th. Standard track joints; 6th. Standard rail; 7th. Standard hand cars.

PERSONAL.

—Vice-President J. A. Rumrill, of the Boston & Albany, has gone to Europe.

—James Smith has resigned as General Traffic Manager of the Wabash Western, and the position has been abolished.

—W. E. Gray has resigned the position of Assistant Superintendent of the Kansas City Division of the Chicago & Alton.

—C. V. V. Ward, for 17 years the Eastern Passenger Agent of the New York, Lake Erie & Western in New York, has resigned.

—William K. Vanderbilt sailed from New York last week for an 18 months' trip around the world on his new steam yacht the *Alva*. Gibraltar will be the first stopping place.

—Howard J. Ball, Division Passenger Agent of the New York, Lake Erie & Western, at Elmira, N. Y., has resigned his position to become General Western Passenger Agent of the Lackawanna.

—James S. McEntee, a civil engineer, died at Rondout, N. Y., on June 30, aged 87 years. He was one of the engineers who laid out the Erie Canal and the Union Canal of Pennsylvania and surveyed the Delaware & Hudson Canal. In 1847 he built a section of the New York Central & Hudson River road from Tarrytown to Irvington. He also surveyed the Ulster & Delaware road.

—Hon. Bion Bradbury, President of the Sewell Safety Car Heating Co., died in Portland, Me., on July 1, at the age of 75 years. He was born in Biddeford, graduated at Bowdoin College in 1830, and was admitted to the York County bar in 1834. He was appointed Collector of Customs of Eastport in 1844, and was reappointed by Presidents Polk and Pierce.

He was a member of the Legislature in 1842, 1849 and 1850; a member of the National Democratic Convention in 1856 and 1860. In 1862 he was elected a member of the Legislature from Eastport, by both parties, as a Democrat. In 1863 he was Democratic candidate for Governor, but was defeated. Since 1864 he has been practicing law at Portland. He was lately appointed Surveyor of the Port, and held this office at the time of his death.

ELECTIONS AND APPOINTMENTS.

Chicago, Burlington & Quincy.—G. R. Dunbar has been appointed General Agent, office at Des Moines, in place of Alfred Wingate.

Chicago, Kansas & Nebraska.—B. Bailey has been appointed Chief Train Dispatcher of the entire system, with headquarters at Horton, Mo.

Chicago, Kansas & Southwestern.—The directors of this new Kansas company are: John Schilling, E. N. Morrill, Geo. O. Brown and George H. Adams, of Hiawatha, Kan.; George Bonker, of Rulo, Neb.; and Joseph Hanson and Jno. Doniphan, of St. Joseph, Mo.

Chicago & State Line.—The incorporators of this Illinois company are: Frederick P. Alcott, William K. Vanderbilt, James A. Roosevelt, and John S. Kennedy, of New York; John Newell, A. G. Amesden, P. S. Blodgett, Phiny B. Smith, and N. A. Skinner, of Chicago.

Cincinnati, Indianapolis, St. Louis & Chicago.—J. J. Collier has been appointed Traveling Freight Agent, headquarters at St. Louis.

Delaware, Lackawanna & Western.—Howard F. Ball has been made General Western Passenger Agent, with headquarters at Buffalo, N. Y.

Flint & Pere Marquette.—The following officers have been elected: President, W. W. Crapo, New Bedford, Mass.; Vice-President and General Manager, H. C. Potter; Secretary and Treasurer, H. C. Potter, Jr.

Georgia.—John S. Cook, Master Mechanic, has taken charge of the work of maintenance of cars in addition to his present duties.

Knoxville & Midland.—This company has been organized in Tennessee as an auxiliary to the Tennessee Midland. The officers and directors are: T. C. Leake, Jr., President, and R. L. Traylor, Secretary and Treasurer. The directors are: T. C. Leake, Jr., and E. D. Christian, of Richmond, Va.; Dr. D. T. Porter, R. L. Traylor, Ben. Wilson and Col. Josiah Patterson, of Memphis; and Dr. Wm. Morrow and Col. James L. Gaines, of Nashville.

Lincoln & Black Hills.—The incorporators of this Nebraska company are: G. W. Holdredge, President, and J. G. Taylor, Secretary.

Little Rock & State Line.—The incorporators of this Arkansas company are John D. Adams, S. B. Adams, J. F. Boyle, J. R. Miller, of Little Rock; E. W. Rector and J. M. Keller, of Hot Springs, Ark.

Missouri Pacific.—A. W. Dickinson has been appointed General Superintendent of this road and this Missouri, Kansas & Texas, north of Texas, vice William Kerrigan, resigned. Joseph Herrin has been appointed General Superintendent of the St. Louis & Iron Mountain, the Memphis & Little Rock and the leased lines of the Missouri Pacific in Texas, comprising the main line and branches of the Missouri, Kansas & Texas in Texas, the International & Grand Northern and the Galveston, Houston & Henderson.

New York, Mahoning & Western.—The incorporators of this Ohio company are Ben. LeFevre, O. P. Rany, L. M. Schwan, E. R. Chapman, C. U. Haskell, W. F. Reed and W. W. Sutton.

New York, Pennsylvania & Ohio.—George W. West has been appointed Master Mechanic Eastern Division, vice J. A. Cooper, resigned. Office at Meadville, Pa. Washington Lavery, Master Mechanic Mahoning Division, office at Cleveland, O., vice Mr. West, transferred.

Northern of New Hampshire.—Superintendent Todd, of this and the Concord & Claremont roads, has issued a circular containing the following appointments: H. N. Turner, General Traffic Manager; D. C. Prescott, General Freight Agent; George W. Storer, General Passenger Agent; George E. Shepard, Purchasing Agent, with offices in Boston; James W. Flavin, Auditor; E. M. Burleigh, Cashier, with offices in Concord.

Palatka, Welaka & Lake.—The incorporators of this Florida company are Sherman Conant, Charles B. Fenwick, W. P. Couper and J. H. Farrington. Mr. Conant is President.

Poughkeepsie & Delaware Valley.—The directors last week elected H. K. Low President and John Barton Secretary and Treasurer.

Riverside & Arlington Electric.—The directors of this new California company are: Matthew Gage, S. C. Evans, James Bettner, A. S. White, Thomas Bakewell, W. J. J. Jarvis and G. O. Newman.

Terre Haute & Logansport.—George E. Farrington has been appointed Assistant General Freight Agent, vice J. R. Kendall, resigned.

Wabash Western.—M. Knight has been appointed General Freight Agent, with headquarters at St. Louis. W. H. Knight has been appointed Assistant General Freight Agent. Assistant General Manager Charles M. Hays will, until further notice, act as General Manager, vice A. A. Talmage, deceased.

OLD AND NEW ROADS.

Alabama, Florida & Atlantic.—The bond and trust deed for this company has been recorded at Tallahassee, Fla. It is to the Mercantile Trust Co., N. Y., for \$5,500,000. The road begins at a point on the Alabama line, runs south-easterly through Florida, and ends at Biscayne Bay on the Atlantic coast. It is some 500 miles in length and connects with the Louisville & Nashville at its Northern terminus. John C. Prentice, of Woodbridge, Orange County, has the contract for the first 75 miles of road, and will begin work in 90 days.

Arkansas, Kansas & Colorado.—Ford County, Kansas, has voted \$125,000 for the aid of this company, and \$58,000 to the Dodge City, Montezuma & Trinidad.

Arkansas Midland.—The work of widening this road to standard gauge will commence on July 9.

Atchison, Topeka & Santa Fe.—The directors of the Chicago & Grand Trunk have ratified the sale to this company of various pieces of real estate in Chicago valued at \$1,000,000. Part of the land between Fourteenth and Sixteenth streets and fronting on State street is to be used by the Atchison as the site of its principal freight depot.

Atlantic & Pacific.—In February last the California Railroad Commissioners made a demand on this company for a statement of its operations during 1886. The headquarters of the company are in New Mexico and there is an agency in San Francisco. The officials objected to the demand, claiming it was unauthorized. William Hazledine has now filed with the commissioners an account of the operations of the company for 1886, which is said to be a copy of that filed with the Secretary of the Interior. In his letter Mr. Hazledine says:

"In making this statement I desire to reiterate what I said at our meeting of Feb. 10, 1887, which is, that we are a federal corporation, and are, by the act creating us, constituted a federal agency, and are vested with full powers to regulate our own fares and freights; and are further required by said act to make an annual report to the secretary of the Interior, according to a form prescribed by his department. That, in view of the foregoing, I do not believe we should or could be compelled by your board to make any report; but being anxious and desirous of aiding you in every way possible in the performance of your duties, I furnish you the annexed statement."

The report gives merely a statement of well-known facts concerning capital, indebtedness, mileage, etc.

Baltimore & Ohio.—The company has had the Staten Island Bridge case removed from the courts of New Jersey to the United States Circuit Court, and it will come up in the latter court in Trenton, N. J., on July 12.

Bangor & Piscataquis.—The president of this company has signed the lease of the Bangor & Katahdin Iron Works railroad for 999 years at a price equivalent to \$10,000 a year, subject to ratification by the stockholders.

Boston & Maine.—The first limited train in New England composed exclusively of Pullman cars, left the Boston & Maine station in Boston on July 5, for Bar Harbor, Me. A similar train left Mt. Desert Ferry at 8 o'clock, arriving in Boston at 5 o'clock, making the 301 miles in 9 hours.

California Central.—The company has its roadbed nearly all graded south from Rincon, Cal., the present terminus, to a point several miles below San Juan, on the sea coast, the new seaside resort, 3 miles below San Juan Capistrano. The grade follows the beach for about 15 miles.

The stockholders of this company voted last week to extend the term of the corporate existence for 25 years from July 1, 1887.

Canadian Pacific.—The tender of this company for the English mail service on the Pacific includes an offer to contract for the ocean service at a speed of 15 instead of 11 knots, and to build its boats under Admiralty supervision, so that they may be readily converted into armed cruisers, for a subsidy of £100,000 per annum. In addition it offers to carry the China and Japan mails for 3,500 miles across the continent of America free of charge, and to carry troops and Government stores over the same distance of land and over the ocean at cost price.

The second steamer, the *Parthia*, on this company's Pacific line, arrived at Vancouver on July 4, 13 days and 12 hours from Yokohama, with a full complement of passengers and 2,970 tons of freight.

Central Massachusetts.—Five suits have been brought by Thomas C. Davis and others against this company to recover an aggregate amount of \$200,000 for money loaned to the company by Norman C. Munson, the contractor, whose claim on account of the same has been assigned to the plaintiffs.

Centralia & St. Genevieve.—The survey of this road was begun from Coulterville, Ill., last week.

Chautauqua Lake.—It is officially announced that this company has bought the Red Stack Line of steamers from the Buffalo, New York & Philadelphia, and will operate the same as the Chautauqua Steamboat Co.

Chautauqua.—It has been decided to extend this road into the heart of the Adirondack Mountains. It will probably run within 3 miles of Paul Smith's, 6 miles of the Prospect House on the Upper Saranac Lake, and 8 miles from Lake Placid.

Chicago, Milwaukee & St. Paul.—The company is building a dam on the Wisconsin River at a cost of \$200,000. The pond so formed will cover 11,000 acres.

R. B. Langdon, of Minneapolis, Minn., has the contract for a branch 9 miles long from Hopkins Station to the St. Louis Hotel on Lake Minnetonka.

Chicago, Kansas & Arkansas.—This recently incorporated company has announced the route of its road, and preparations are making for beginning work at once. The line, as laid out, will start at St. Joseph, Mo., cross the Missouri River there, and run over the St. Joseph & Grand Island to Wathena, Kan., five miles west of St. Joseph; there it will

turn south and go through Doniphan, Kan., 10 miles below St. Joseph. From Doniphan it will go up Independence Creek by way of Farmington and Nortonville to Kansas City, with a branch west to Oskaloosa and Lawrence, Kan. From there the line will go to Fort Smith and Van Buren, Ark., and ultimately to Little Rock.

Chicago, Kansas & Southwestern.—Incorporated in Kansas. The proposed road will extend from some point in Nebraska through Kansas for a distance of 250 miles, and Hiawatha will be the principal terminus. Capital stock, \$5,000,000.

Chicago & Northwestern.—Work is progressing from Gettysburg, in Potter County, Dak., on the Yankton branch of this road. The extension, which is about 40 miles, will be completed about Sept. 1.

Chicago & State Line.—Articles of incorporation filed in Illinois. It is proposed to build a road into and through the county of Cook from a point on the line between the states of Indiana and Illinois, at the intersection of the New York, Chicago & St. Louis, to Chicago. Capital stock, \$1,400,000, of which \$700,000 is to be common stock.

Cincinnati, Indianapolis, St. Louis & Chicago.—This company has brought suit against the Tiffany Refrigerator Car Co., in Chicago, claiming \$100,000 damages on account of the failure of the defendant company to build 250 refrigerator cars before December, 1886, for the plaintiff.

Clinch Valley.—Mr. Walton, of Tazewell, Va., has received the contract for building 25 miles of this road.

Cumberland & Piedmont.—The well known Cookery farm case showed up again this week. This company began its second attempt to condemn the leasehold interest of C. F. Mayer and the Cumberland & Pennsylvania Railroad Co. The inability of the Cumberland & Piedmont to build across this land prevents the completion of the road.

Delaware & Hudson Canal.—It is rumored that this company intends making a connection from Whitehall, N. Y., to the Rutland & Washington division, either at Poutney, Raceville or Granville in order to make a short line from Canada to Eagle Bridge, N. Y., there connecting with the Fitchburg for Boston. As a route between Rouse's Point and Boston, this would be much longer than any of the present ones. Some passenger business has been done, however, between Montreal and Boston via Albany.

Denver, Texas & Fort Worth.—J. R. De Remer has the contract for a 10-mile branch of this road from Trinidad, Col. J. J. Brown & Co. have the contract for grading 50 miles east of Trinidad.

Detroit, Lansing & Northern.—McRae & Lally, of Detroit, Mich., have the contract for building the extension of this road from Grand Lodge to Grand Rapids, Mich.

Dover & Winnepesaukee.—A bill has been introduced in the New Hampshire Legislature to amend the charter of this road. It authorizes the extension of the line to Lake Village and Laconia, N. H., and an increase of the capital stock to \$1,000,000. The road now extends from Dover to Alton Bay, N. H., 29 miles, and the present capital is \$480,000. It is leased to the Boston & Maine, and the proposed amendment provides for the leasing of the extension.

Duluth, Huron & Denver.—Grading was commenced from Sauk Centre, Minn., last week. The first section of 90 miles from Sauk Centre to the Dakota line is to be graded within 60 days. The road, as originally intended, was to run from Duluth, Minn., to Huron, Dak.

East Louisiana.—This line, owned by Poitevent & Faure, has been opened for business between New Orleans and Abita Springs, La., 21 miles.

Flint & Pere Marquette.—At the recent annual meeting the construction of 300 freight cars and the purchase of 2,000 tons of steel rails was authorized.

Fort Smith, Wellington & Northwestern.—Arrangements have been consummated with Eastern capitalists for the building of this road. Bonds have been voted from Arkansas City to Russell, Kan., aggregating \$724,000.

Fort Worth & Denver City.—The extension of this road is now completed for eighty-five miles north of Quanah, Tex., and over half way between there and the Canadian River, in the Indian Territory.

Gulf, Colorado & Santa Fe.—Ricker, Lee & Co., of Galveston, have the contract to build the extension of this road from Cleburne, Tex., to Weatherford, 42 miles.

Hannibal & St. Joseph.—The long litigation between the State of Missouri and this company ended last week in the company's paying into the state treasury \$172,842—all the demands of the state as decreed by the United States Supreme Court. The state's claims were first mortgage liens on the railroad's property and franchises.

Housatonic.—The company has voted to pass the usual dividend of 6 per cent. upon the preferred stock. W. H. Stevenson, vice-president, explains the matter as follows: "The present management decline to pay dividends which are not earned. In the past the policy of the road has been to borrow money from the banks in the face of a large floating indebtedness. We intend to pay off this floating indebtedness soon and then to pay an earned dividend on the stock. Those who own the great majority of the stock prefer to give up a year's dividend rather than to borrow money to pay one. To pay one now would be much like borrowing money for the sake of transferring it from one pocket to another."

Indiana & Lake Michigan.—Incorporated in Indiana, to build a road from South Bend to Buchanan, Mich. Capital stock, \$200,000.

Knoxville & Midland.—Charter filed in Tennessee. The company is organized as an auxiliary of the Tennessee Midland to enable that company to carry its main line via Knoxville, instead of building a branch to that city, as was at first contemplated.

Lehigh Valley.—It is stated that an alliance has been formed between this company and the Central of New Jersey, by which the Lehigh Valley is to send all its freight to Jersey City over the Central, and the latter is to have access to the terminals of the Lehigh Valley in Buffalo. The two companies will also unite in making improvements upon the terminals of the Central at Jersey City. The passenger business of the Lehigh Valley will continue to go to New York by the Pennsylvania.

Lincoln & Black Hills.—Articles of incorporation filed in Nebraska. The object is to build a road from Central City in a northwesterly direction through the counties of Merrick, Howard, Greeley, Wheeler, Garfield, Hob, Brown and Keyapolls, with branch lines in the counties of Merrick, Howard, Sherman, Valley, Greeley, Custer, Loup, Blaine, Brown, Cherry, Nance, Boone, and Wheeler. Capital stock, \$5,000,000. Principal office, Central City.

Little Rock & State Line.—Articles of incorporation have been filed in Arkansas. The road is to be built from

Little Rock to the line between Arkansas and the Indian Territory, and will pass through the counties of Pulaski, Saline, Garland, Montgomery and Polk. Capital stock, \$1,000,000.

Maine Central.—The company has just completed its second track between Portland and Cumberland, Me. This gives a double track from Portland to Waterville, 84 miles.

Maricopa & Phoenix.—The road is now in running order from Maricopa to Tempe, Ariz. The depot buildings are now building in the latter place.

Marietta & North Georgia.—Negotiations are said to have been completed for extending this road from Murphy, N. C. to Knoxville, Tenn. The road is now completed to Murphy. The distance from Murphy to Knoxville is about 75 miles. It is definitely stated that as soon as the road is completed to Knoxville it will be changed to standard gauge.

Massena Springs & Fort Covington.—Tracklaying was begun on this road at Fort Covington, N. Y., last week. The line will be 23 miles long.

Milwaukee & Northern.—The 45-mile extension of this road from Iron Mountain to Republic, Mich., will probably not be completed before October. It is reported that the company has decided to build a 10-mile extension from Republic north to the Champion mine, which is located on the main line of the Marquette, Houghton & Ontonagon road.

Minnesota & Northwestern.—This company has completed a stretch of road from a junction with the Wisconsin Central at a point 9 miles out of Chicago to Freeport, Ill., though as yet no trains have been put on the road. It is not thought that the line will be operated until it is completed through to East Dubuque, where it joins the Minnesota & Northwestern, already constructed from St. Paul, Minn., to Dubuque, Ia. A large force of graders is now at work between Freeport and Dubuque. A long tunnel is being driven on the western end of the line. It is thought that the road can be opened for traffic between Chicago and Dubuque about Nov. 1.

Missouri Pacific.—The work of grading has begun on this road east from Pueblo, Col., to connect with the line now building from Ness City, Kan., to Pueblo. Carlisle, Price & McGarock are the contractors for the first forty miles. The road is to be completed by Dec. 1.

Mobile & Dauphin Island.—The Neil McDonald Railroad Supply Co. has the contract for this road, 36 miles from Mobile, Ala., to Dauphin Island. The Phoenix Bridge Co. will build the bridges, and the steel rails will be supplied by the Tide Water Steel Works, Chester, Pa.

Mohawk & Susquehanna.—Articles of incorporation filed in New York. The proposed road will run from Canajoharie to Richfield Springs and Cooperstown, N. Y. Capital stock \$1,000,000. Sidney Dillon, of New York, is at the head of the company.

Nashville & Chattanooga.—Creighton & Foster, of Nashville, Tenn., have received the contract for building 15 miles of the extension of this road.

New York, Mahoning & Western.—Articles of incorporation have been filed in Ohio. The proposed road will extend from Youngstown to Van Wert, passing through the counties of Mahoning, Trumbull, Portage, Geauga, Summit, Cuyahoga, Lorain, Medina, Ashland, Richland, Huron, Seneca, Crawford, Wyandot, Hancock, Putnam, and Paulding. Capital stock, \$1,000,000. Headquarters at Findlay, O.

New York & Rockaway.—This is now the name of the New York, Woodhaven & Rockaway, recently bought at foreclosure sale by the Long Island road.

New Roads.—Work has commenced on the new road between Hobart and Oneonta, N. Y., which, when completed, will be a direct route from the latter place to Kingston through Cooperstown.

Northern California.—It is stated that the owner of this road, N. D. Rideout, will extend it from Marysville to Grafton, Cal., 25 miles. It now runs from Oroville to Marysville, 29 miles.

Memphis & Little Rock.—The announcement is made that this road will soon be extended from Little Rock, Ark., by way of Hot Springs to Dallas, Tex.

Pacific.—The investigating committee has taken testimony this last week in Columbus, Neb., St. Joseph, Mo., Atchison, Kan., and Leavenworth, Kan. In the first city the witnesses said that there had been some complaints to the management of the Union Pacific, much of it owing to the giving of passes and privileges to politicians, but that things had improved under President Adams. At St. Joseph the testimony was to the effect that the Union Pacific had discriminated against that city in favor of Omaha. At Atchison Governor Glick testified that since the creation of the Kansas Railroad Commission in 1883 there have been fewer complaints of discrimination by the Pacific roads. He did not believe that the Central Pacific would pay its share of the debt due the government, and he thought the Pacific roads had improved the region through which they passed sufficiently to warrant cancellation of the debt.

Palatka, Welaka & Lake.—Charter filed in Florida for a railroad to run from Palatka to the St. John & Lake Eustis Railroad, with a branch to Georgetown.

Pennsylvania.—Proposals for furnishing all labor and materials and performing all work for a single track railroad (Maurice Railroad Co.) between Manumasskin, N. J., and Port Morris, on Delaware Bay, 10 miles, will be received until July 11 by William H. Brown, Chief Engineer, 233 South Fourth street, Philadelphia.

Philadelphia & Reading.—Messrs. Dallas & Pollock, the Masters in the Robinson foreclosure suit against this company, will be unable to file their report within the prescribed time, July 10. The Masters may apply to the Court for an extension of time to complete their work, though it is probable the matter will be dropped, as it is now admitted that the decree, if obtained, would not be executed. There will be about \$2,600,000 to the credit of the trustees from the money paid in under the call for the second installment. This is nearly equal to the sum received for the first installment, making in all about \$5,500,000. Of this, \$3,000,000 has been used to pay off the receiver's certificates. The trustees intend to pay a portion of the floating debt with this money. The floating debt secured by collateral is a little over \$5,000,000, most of which is being carried at 5 per cent. The securities pledged for the debt are worth considerably more than \$5,000,000. The proceeds of the third and fourth installment will enable the trustees to pay the balance of the floating debt and the expenses of reorganization, leaving about \$2,000,000 to be devoted to the improvement and extension of the property—or for other purposes.

Pittsburgh, Marion & Chicago.—This road was opened for business between Rogers, O., and New Lisbon, a distance of 11 miles, on June 9. The road is now in opera-

tion from New Galilee, Pa., to New Lisbon, O., 25 miles, connecting at the former place with the Pittsburgh, Fort Wayne & Chicago, and at the latter with the Niles & New Lisbon division of the New York, Pennsylvania & Ohio.

Red River Valley.—A crowd of 3,000 people turned out at Winnipeg, Manitoba, on July 2, to see Premier Norquay break the first ground for the new railroad to the boundary. There was general jubilation.

Richmond & Danville.—The Court has denied the application made last week by Powers & Co., of Lansingburg, N. Y., for an injunction restraining this company from paying the 3 per cent. dividend ordered by the directors.

Riverside & Arlington Electric.—This company has been incorporated at Riverside, Cal., to build 12½ miles of road in one line and additional branches as they are needed.

St. Joseph & Grand Island.—The track on the St. Joseph branch is laid into Stromsburg, Neb. This completes the part of the line running from Fairfield to Stromsburg via Sutton, 65 miles. Work will now begin at McCool Junction, 39 miles from Fairfield, and a line be built from there to Fairbury, Neb., 50 miles.

St. Louis, Arkansas & Texas.—The Sherman extension is now completed to within 12 miles of Sherman, in Grayson County, Tex.

St. Louis & San Francisco.—The Circuit Court at St. Louis, Mo., has decided that Russell Sage was illegally elected a director at the last annual meeting of this company, and that E. L. Oppenheim, of New York, is entitled to the seat. The Court says that "the refusal to allow petitioners to see the stock books during the 30 days preceding the election was a high-handed violation of the law, and was evidently done to defeat the election of Mr. Oppenheim."

"The stock did not stand in the name of Oppenheim & Co. on the books the day of the election, the man having charge of the books having allowed entries to be made showing a transfer from Oppenheim & Co. to Mr. Seligman. The company had a by-law to the effect that the transfer books should be closed for not less than thirty days prior to the annual meeting of the stockholders. The company gave notice that the books would be closed from April 9 to May 13. No transfers were shown to have been made between the 9th of April and the day of the election, except the one instance on the 10th of May, the day before the election. If the by-law was valid and in force it is clear that the person making the entries of transfer on May 10 was not only acting without authority, but in express violation of authority; and no legal effect can be given to his acts."

St. Louis, Vandalia & Terre Haute.—This company will file a bill for the vacation of the lease of its road to the Terre Haute & Indianapolis, and for its delivery to its owners with an accounting of the profits due. The restoration of the Vandalia to its owners would place the line under the active control of the Pennsylvania.

San Antonio & Aransas Pass.—It was rumored last week that this road had been sold to the Atchison, Topeka & Santa Fe. It is stated that \$1,250,000 worth of San Antonio & Aransas Pass bonds have been sold by President Lott in New York and Boston. It is thought that the extension towards Galveston, Tex., will be held in abeyance for awhile.

Springfield & Southern Illinois.—The surveyors began work at Pinckneyville, Ill., last week. The line will run through Nashville, Carlyle and Greenville, the county seats of Washington, Clinton and Bond counties, and thence through Montgomery County to Springfield.

Tennessee Midland.—The final location of the line from Memphis to the Tennessee River, 135 miles, is now made, and the work will be contracted for at once. From Memphis to Nashville the road passes through Somerville, Jackson, Lexington, Decaturville, Linden & Centerville.

Texas & Pacific.—The company has 15 locomotives, 400 flat cars and a force of 300 extra men at work ballasting and relaying its tracks. Over 130,000 new cross-ties have been laid on the New Orleans division.

Tillamook Railway & Lumbering Co.—This company has recently been organized in Oregon, and will build a narrow gauge road from Garabaldi, Oregon, on Tillamook Bay, to Doherty River, 16 miles, and will also erect a large sawmill on the river. Locomotives have been bought from the Utah & Northern, and rails have been ordered in San Francisco.

Topeka, Stockton & Northwestern.—The County Commissioners of Stockton, Kan., have called an election for Aug. 1, to vote on aiding this new company to the extent of \$109,000. Phillips and Norton counties will vote on the proposition the same day.

Wabash Railway.—Chairman Abbott, of the Western Passenger Association, has been investigating the charges of the Chicago & Alton and the Illinois Central against this company, alleging that the former allows its tickets, issued in blocks of 50 under the rules of the Central Traffic Association, to be manipulated by scalpers, so as to make them good for small parties, and redeems the unused portions, thereby cutting the fare between St. Louis and Chicago \$2.50 each ticket. He finds the charges substantiated by the facts, and yesterday laid the matter before Receiver McNulta, requesting him to have these practices stopped, and thus prevent demoralization of rates.

Wabash Western.—Arrangements have been completed by which this company will have through passenger train service between Detroit and St. Louis over the Vandalia line. The Terre Haute & Logansport, which, together with the St. Louis, Vandalia & Terre Haute, is operated by the Terre Haute & Indianapolis, crosses the Wabash Western at Clymers, Ind., near Logansport, and trains will run via Clymers and Terre Haute.

Wisconsin Central.—It is reported that this company is to build a line from Antioch, Ill., to Lake Geneva, Wis., and thence to Portage, Wis., there to connect with the Stevens Point and Portage line of the system.

TRAFFIC AND EARNINGS.

Cotton.

The cotton movement for the week ending July 1 is reported as below, in bales:

Interior markets:	1887.	1886.	Inc. or Dec.	P. c.
Receipts.....	2,045	6,282	D. 4,237	67.6
Shipments.....	5,385	15,920	D. 10,535	66.1
Stock.....	41,902	86,994	D. 45,092	51.8
Seaports:				
Receipts.....	3,598	13,510	D. 9,912	73.4
Exports.....	13,675	28,232	D. 14,557	64.2
Stock.....	276,587	358,988	D. 82,401	23.0

Total movement from plantations for the crop year ending July 1 was 6,812,076 bales, against 6,428,598 last year, 5,581,418 in 1884-85, and 5,618,887 in 1883-84.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of April:	1887.	1886.	Inc. or Dec.	P. c.
Cape F. & Y. V.	18,929	16,079	I. 2,850	17.7
Net earnings.....	8,182	7,880	I. 302	3.8
Chas. & O. E. W.	2,197,930	1,952,740	I. 245,190	12.5
Net earnings.....	910,131	813,307	I. 96,824	11.8
Ches. & Ohio.....	344,760	317,162	I. 27,604	8.8
Net earnings.....	129,732	105,820	I. 23,902	22.2
Ediz. & B. S.	78,584	65,743	I. 12,841	19.2
Net earnings.....	22,936	24,935	D. 1,999	7.0
Ches. & O. E. W.	127,364	124,070	I. 3,294	2.6
Net earnings.....	37,163	42,126	D. 4,963	13.8
Cl. C. & I.	331,293	281,588	I. 49,705	17.7
Net earnings.....	92,506	87,187	I. 5,319	6.4
C. I. St. L. & O.	292,743	193,831	I. 98,912	4.6
Net earnings.....	76,485	67,133	I. 9,352	1.3
Den. & R. G.	565,744	484,654	I. 81,090	16.7
Net earnings.....	157,301	162,399	D. 5,098	3.7
E. Ten. Va. & G.	393,764	277,376	I. 116,388	30.9
Net earnings.....	51,439	27,225	I. 24,214	88.8
Kentucky Cent.	77,400	66,753	I. 10,647	15.9
Net earnings.....	23,703	23,280	I. 4,23	27.4
Lake S. M.	4,198,557	3,505,204	I. 693,353	19.9
Net earnings.....	1,790,270	1,421,824	I. 368,446	25.9
Louis. & Nash.	1,178,320	967,740	I. 210,580	21.7
Net earnings.....	385,158	313,925	I. 71,233	22.7
Memphis & Chas.	117,293	96,287	I. 21,006	21.8
Net earnings.....	18,244	37,479	D. 19,235	51.2
Min. & St. L.	118,532	110,519	I. 8,013	7.2
Net earnings.....	14,219	25,839	D. 11,620	45.2
Northern Pacific	1,121,605	963,483	I. 158,122	12.8
Net earnings.....	539,642	484,743	I. 54,899	11.3
N. Y., Ont. & W.	118,268	97,611	I. 20,657	21.1
Net earnings.....	15,435	9,328	I. 6,107	65.6
Ogden & L. C.	108,598	103,003	I. 5,595	5.4
Net earnings.....	14,708	26,774	D. 12,066	45.0
Oregon Imp. Co.	304,804	188,241	I. 116,563	35.0
Net earnings.....	77,774	28,654	I. 49,120	17.1
Oreg. R. & N. Co.	437,548	407,973	I. 29,575	7.2
Net earnings.....	183,768	170,037	I. 13,731	2.6
Phil. & Reading	1,751,844	1,359,315	I. 392,529	28.8
Net earnings.....	914,568	408,244	I. 506,324	124.0
P. & R. C. & I. Co.	2,956,422	2,452,920	I. 503,502	20.5
Net earnings.....	948,817	184,836	I. 763,979	413.4
Rome, W. & O.	237,290	213,639	I. 23,651	10.8
Net earnings.....	92,892	82,171	I. 10,721	13.0
Tol. & Ohio Cen.	73,262	58,287	I. 14,975	28.8
Net earnings.....	18,999	18,799	I. 200	1.0
Total (gross).....	17,024,849	14,344,518	I. 2,680,331	11.7
Total (net).....	6,530,052	4,582,937	I. 1,947,115	42.4

Net increase—Jan. 1 to April 30:

Four months—Jan. 1 to April 30:	1887.	1886.	Inc. or Dec.	P. c.
Cape F. & Y. V.	86,618	74,923	I. 11,695	15.6
Net earnings.....	42,087	41,693	I. 394	0.9
Ches. & Ohio.....	1,312,354	1,189,726	I. 122,628	10.3
Net earnings.....	377,774	324,711	I. 53,063	16.3
E. L. & B. S. Co.	305,293	262,039	I. 43,254	16.1
Net earnings.....	84,805	84,805	D. 0	0.0
C. O. & S. W.	549,969	493,969	I. 56,000	11.3
Net earnings.....	197,114	160,001	I. 37,113	23.1
Chas. & O. E. W.	8,083, 02	7,394,150	I. 1,590,062	21.5
Net earnings.....	3,260,328	3,119,426	I. 140,902	36.7
C. C. C. & I.	1,334,959	1,174,163	I. 160,796	13.6
Net earnings.....	212,369	240,593	D. 28,224	11.4
Den. & R. G.	2,967,055	1,874,488	I. 1,092,567	24.9
Net earnings.....	842,293	571,816	I. 270,477	47.3
E. Ten. Va. & G.	1,595,816	1,280,816	I. 309,102	24.0
Net earnings.....	439,461	335,929	I. 103,532	29.0
Min. & St. L.	496,834	447,618	I. 49,216	10.9
Net earnings.....	117,369	108,632	I. 8,737	7.8
Oreg. Imp. Co.	1,100,661	763,679	I. 336,982	44.1
Net earnings.....	212,369	100,084	I. 112,285	112.2
Oreg. R. & N. Co.	1,409,750	1,399,233	I. 40,517	29.7
Net earnings.....	505,723	457,392	I. 48,331	10.5
Rome, W. & O.	876,282	802,605	I. 73,677	9.1
Net earnings.....	329,135	293,127	I. 36,008	10.4
Tol. & Ohio Cen.	315,789	217,875	I. 97,914	44.9
Net earnings.....	111,015	64,571	I. 46,444	71.8
Total (gross).....	20,634,664	17,201,271	I. 3,433,393	19.4
Total (net).....	7,975,247	6,047,927	I. 1,927,320	31.8

Net increase—May 1 to April 30:

Five months—May 1 to April 30:	1887.	1886.	Inc. or Dec.	P. c.
Oreg. Imp. Co.	\$1,841,247	\$1,401,738	I. \$439,509	31.3
Net earnings.....	613,619	411,976	I. 201,643	48.9

Seven months—Oct. 1 to April 30:

Seven months—Oct. 1 to April 30:	1887.	1886.	Inc. or Dec.	P. c.
Rome, W. & O.	1,093,031	1,328,263	I. 134,768	8.6
Net earnings.....	717,766	926,575	I. 91,761	40.2

Ten months—July 1 to April 30:

Ten months—July 1 to April 30:	1887.	1886.	Inc. or Dec.	P. c.
E. Ten. Va. & G.	3,987,793	3,515,028	I. 472,765	13.4
Net earnings.....	1,493,802	1,317,195	I. 176,607	13.4
Oregon R. & N. Co.	4,424,089	4,584,461	D. 160,372	3.4
Net earnings.....	1,939,557	2,094,086	D. 154,529	7.3

Eleven months—July 1 to May 31:

Eleven months—July 1 to May 31:	1887.	1886.	Inc. or Dec.	P. c.
Wash. Chat. & St. L.	2,207,249	1,784,220	I. 423,029	23.6
Net earnings.....	927,075	704,484	I. 222,591	31.7
Lebanon Br.	65,439	50,675	I. 14,764	29.1
Net earnings.....	43,553	25,402	I. 18,151	71.4
McMinnville Br.	66,745	56,745	I. 10,000	13.0
Net earnings.....	28,846	22,936	I. 5,910	30.0
Fayetteville Br.	54,931	43,668	I. 11,263	25.7
Net earnings.....	25,133	10,845	I. 14,288	132.2
Tracy City Br.	59,677
Net earnings.....	28,709
Centerville Br.	49,886	44,058	I. 5,828	13.2
Net earnings.....	13,864	17,692	D. 3,828	21.9
D. R. V. Br.	51,818	30,802	I. 21,016	68.2
Net earnings.....	9,936	8,774	I. 1,162	13.3
Total (gross).....	\$2,533,177	\$2,009,978	I. \$523,199	26.2
Total (net).....	1,077,808	790,043	I. 287,765	36.0

Year to March 31:

Year to March 31:	1887.	1886.	Inc. or Dec.	P. c.
Og. & L. Champ.	683,213	562,772	I. 120,441	21.3
Net earnings.....	229,200	223,444	I. 5,756	2.5

Year to Dec. 31:

Year to Dec. 31:	1887.	1886.	Inc. or Dec.	P. c.
Ches. & O. E. W.	1,713,325	1,571,155	I. 142,170	9.0
Net earnings.....	651,942	502,530	I. 149,412	29.7
Gal. H. & S. A.	2,599,462	3,199,077	D. 599,615	18.7
Net earnings.....	277,039	1,494,107	D. 1,217,068	83.9
South Carolina	1,120,000	1,151,840	D. 31,840	2.7
Net earnings.....	137,404	328,157	D. 190,753	58.1
Wisconsin Cen.	1,565,313	1,461,004	I. 104,309	7.0
Net earnings.....	383,233	519,123	D. 135,890	62.0

*This includes the Black River road in both years.

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Coal.

The coal tonnages for the week ending July 2 are reported as below:

	1887.	1886.	Inc. or Dec.	P. c.
Anthracite.....	676,085	481,703	I. 194,382	40.3
Bituminous.....	264,499	290,778	D. 26,279	9.0
Coke (June 25).....	30,599	85,120	D. 54,521	64.0

The coal movement of the Pennsylvania road for the week ending June 25, was:

	Coal.	Coke.	Total.	1886.
Line of road.....	201,472	30,599	232,071	255,564
Year to June 25.....	5,034,916	1,618,414	6,653,330	7,012,259

Decrease for the week 23,493 tons, or 9.1 per cent.; decrease for the year 358,929 tons, or 5.1 per cent.

Complaints to the Inter-State Commission.

Doheny & Marnum, of Walla Walla, W. T., complain to the Inter-State Commerce Commission that the freight per hundred on cotton piece goods from Chicago to Walla Walla is \$4.70, while to Portland, Ore., 250 miles further, it is only \$1.20 per hundred.

The Associated Wholesale Grocers of St. Louis have filed an amended complaint against the Missouri Pacific to the effect that thousand mile tickets for commercial travelers are sold for not less than \$25, while excursion tickets to certain points on the line of the road are sold at rates which for 1,000 miles would amount to not more than \$10 or \$15.

East-bound Shipments.

The shipments of all freight except live stock from Chicago eastward to seaboard points during last week amounted to 42,808 tons, against 41,433 tons for the week previous. The percentages carried by the different roads were as follows: Baltimore & Ohio, 23.2; Chicago & Grand Trunk, 16.0; Chicago, St. Louis & Pittsburgh, 10.7; Lake Shore & Michigan Southern, 11.3; Michigan Central, 14.2; New York, Chicago & St. Louis, 4.6; Pittsburgh, Fort Wayne & Chicago, 18.8; Cincinnati, Indianapolis, St. Louis & Chicago, 1.2.

Iron Shipments